MODERN PLASTICS

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APRIL, 1936 VOLUME 13 NUMBER 8

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WHITING N. SHEPARD

NEXT MONTH

Whiting N. Shepard of the Plaskon Company, Inc., who wrote "Refrigerators are no longer cool to plastics" for our September 1934 issue, has gone from one extreme to the other by writing an article called "Hot stoves need insulated handles" which will appear in May.

Another article, "Plastics combined with metals" written by Herbert Chase, should interest those who use metal hardware or parts for almost any purpose.

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APRIL 1936 VOLUME 13 NUMBER 8

Industry and the soy bean

BY E. F. LOUGEE

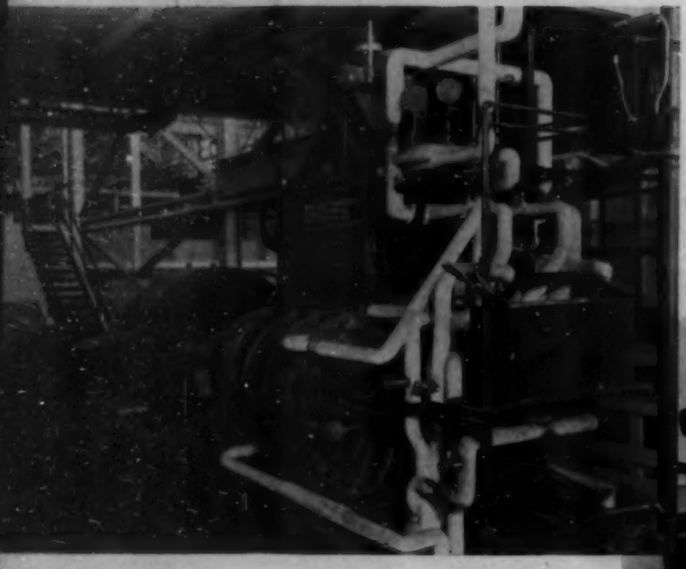
Soy beans growing on Ford's Experimental Farm

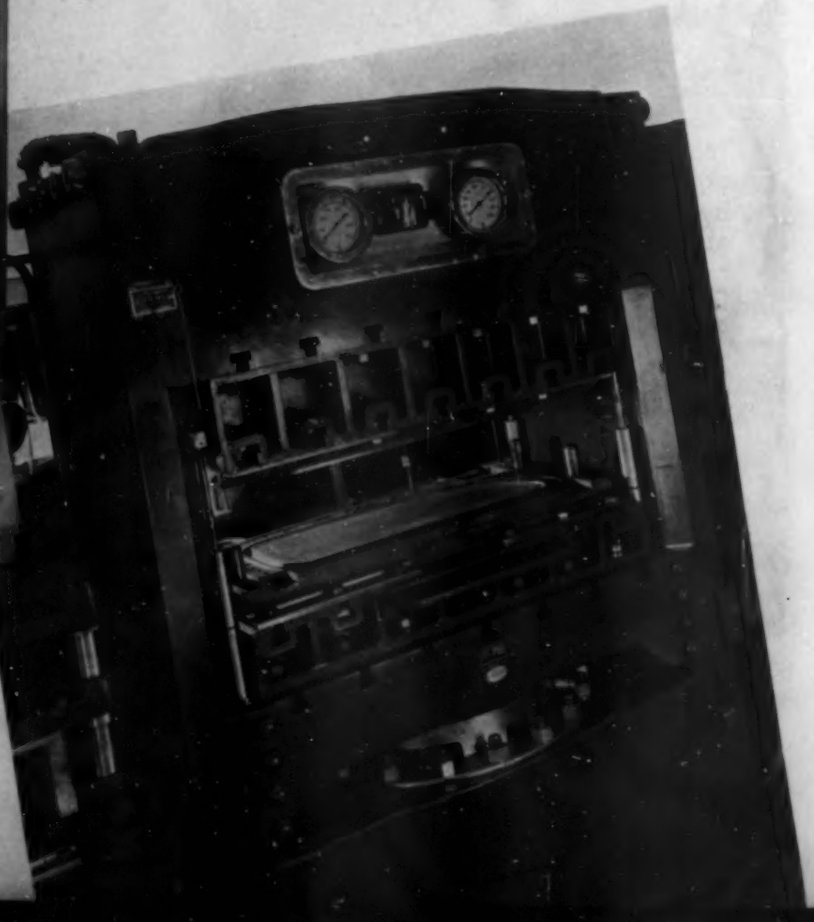
This is the first complete authentic story of the experimental development of soy bean plastics by the Ford Motor Co. The information was obtained by personal interviews with Ford executives both in the Engineering Laboratory at Dearborn and in the River Rouge molding division of the company

THE story of soy bean plastics has been fraught with much mystery and speculation, yet as a matter of fact it can be readily reduced to perfectly simple and natural terms and is an industrial and agricultural development of genuine interest. The scope of this interest reaches far beyond those engaged in the plastics industry—even beyond those manufacturers who use plastics extensively in their manufactured goods. Broadly speaking, it dips into a problem of national concern and there is no telling yet just how far it will go. It is sufficient for the moment to observe that the economic problems of agriculture and industry are not as distantly separated as some suppose.

The soy bean, an oriental commodity which constitutes a considerable part of Manchurian farm wealth, has suddenly become one of the most swiftly expanding crops in America. Last year, American farmers produced 40,000,000 bushels of soy beans—twice as much as the preceding year—according to the Department of Agriculture which recently announced the establishment of a soy bean industrial research laboratory at Urbania, Ill. Twelve north central states will cooperate in maintaining the laboratory.

Soy beans are used in making industrial and food products such as paint, enamel, varnish, glue, printing ink, rubber substitutes, linoleum, insecticides, plastics,





Top, balconies in the Ford plastic plant where chemicals are electrically weighed, then fed by gravity to the steam jacketed mixers on the main floor

Below, one of the mixers showing conveyor belt in lower right corner where material is carried to the Banbury mixers for completion

At right, close-up of one of the specially designed molding presses where garnish trim for Ford closed model cars is molded from soy bean plastics

glycerin, flour, soy sauce, breakfast foods, candies, roasted beans with nut-like flavor, livestock feeds, and so on, the Agricultural Department reported.

At present about thirty-five soy bean mills and a number of cotton-seed oil mills are crushing soy beans for oil and soy meal. Twenty concerns are manufacturing soy bean food products. Fifteen mills are making soy bean flour and more than fifty factories are turning out various industrial products, the Ford Motor Company being, by far, the largest.

Since Henry Ford is the pioneer in the soy bean plastic development in this country, let us begin with a quotation which clearly illustrates his point of view and his reason for the development:

"I believe that industry and agriculture are natural partners," says Mr. Ford. "Agriculture suffers from a lack of a market for its product. Industry suffers from a lack of employment for its surplus men. Bringing them together heals the ailment of both. I see the time coming when the farmer not only will raise raw materials for industry, but will do the initial processing on his farm. He will stand on both his feet—one foot on the soil for his livelihood; the other in industry for the cash he needs. Thus he will have a double security. That is what I am working for!"

To put this theory into practice, Mr. Ford decided in 1930 that an increasing use of agricultural products by the Ford Motor Co. should constitute one of the major problems of the Edison Institute, and should be given attention by those engineers in the company interested in research. As a result of this program in which enormous amounts of money and effort have been invested, the Ford Motor Co. is about to launch one of the most prodigious plastic molding plants in the world within a few months.

This doesn't mean that this company is just begin-

ning to mold plastics. More than two hundred molding presses are in operation today turning out conventional moldings of electrical parts, such as distributor heads, horn buttons, electrical switch assemblies, and gear control knobs. Some of these parts are being molded of soy bean plastics and many new applications are under way experimentally.

It does mean, however, that the making of soy bean and other vegetable and protein plastics at the Ford plant has just begun and it is reported that the new equipment when completed may represent an investment of nearly five million dollars. For this purpose, one half of the huge glass plant at River Rouge has been reconditioned. Twelve mixers, each capable of turning out 1500 lbs. of soy bean or other plastic material every two and one half or three hours, are being installed. Two of them are already operating. Huge storage tanks of phenol and formaldehyde are already in place. Acres of space are piled high with soy bean meal and fillers, and many parts are now in production in the molding division.

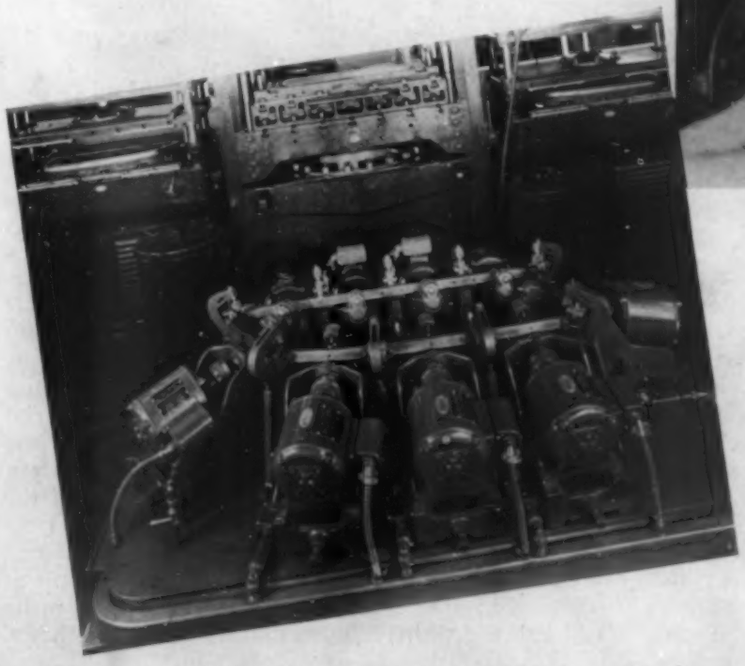
It is interesting to note at this point that soy bean plastics as made by Ford do not follow the conventional methods employed by other manufacturers of phenolic plastics. Since none of the Ford resin is diverted to the manufacture of varnish, the batch does not come from the mixer in liquid form. The soy meal is mixed with phenol and a part of the total quantity of formaldehyde required, and a suitable accelerator, in a steam jacketed mixer (see illustration) where it reacts for fifteen or twenty minutes. This results in a mixture which is partly phenol formaldehyde and partly casein hardened by the formaldehyde into resin which contains the cellulose of the meal.

Then the remaining quantity of formaldehyde and accelerator is added and the reaction is continued for another twenty minutes, approximately, to convert the remaining phenol into resin as well as to complete any reaction with the protein not previously completed. At this point the filler (wood flour) is added, together with clay and stearic acid to promote smooth molding and the batch remains in the mixer until its water content has been reduced to about 10 per cent. The quantity of wood filler used runs from 50 to 60 per cent.

The batch emerges on a continuous conveyor in the form of a lumpy mass which has only to be dried and granulated in a Banbury mixer to be ready for the press. At least two operations are thus saved and the cost of production is lowered proportionately. Uniformity of batches is regulated perfectly by an elaborate system of electrical scales controlled by photo-electric cells.

Now let us go back for a moment and see just where agriculture is to benefit from this development. "Soy beans were chosen for our experimental development," says R. H. McCarroll, in charge of chemical manufacturing and engineering, "because they can be grown almost anywhere in the United States. They may be grown in soil too acid for other legumes. They are remarkably drouth resistant. They supply nitrogen to the soil rather than deplete the soil of it."

Large scale work on soy beans began in 1932 when the Ford Motor Co. planted 8,000 acres. Last year, this acreage was increased (*Continued on page 54*)



Soy bean gear shift knobs are taken from this press at the rate of six thousand a day. Very little finishing is required

And at the left, you see a multiple drill which drills nine attaching holes simultaneously in each garnish trim before it goes on the conveyor line. One of these drills faces each press in production

Translucent laminated and photo inlays

ARCHITECTS and decorators will welcome these new translucent sheets of laminated phenolics for indirect lighting spots, and for panels in bars and counters where, with lights behind, they provide a luminous effect of striking character. They are strong and not easily broken and, of course, have the usual lasting qualities of all phenolics and cannot be chipped or marred through use. Their natural luster does not dim with age and no finishing other than occasional cleaning is ever required.

The material may be had in plain white or in white with an opaque surface in any of the phenolic colors. Opaque surfaces may be sand-blasted away—making possible any type of design that can be produced by such methods. It also may be had in translucent colors, such as red, orange, blue, green, etc., which with opaque sand-blasted effects present a new and interesting treatment.

The bar at the Netherland Plaza Hotel in Cincinnati illustrates how such panels are being used with

Photo inlays laminated into phenolic material for permanence. Below: Translucent phenolic laminated panels in bar and back-bar lighted with Neon

Neon lights behind to accentuate colorful decorative effects. The orange translucent circular panels on the back bar are lighted with Neons with pleasing result.

For permanent directional signs requiring color that will not change, this translucent material is available in sheets from 1/16 in. in thickness, up. Dark colored letters may be laminated or inlaid, and where light colored letters are required against a dark background this can be sand-blasted to remove the opaque sheets as desired. Inlaid letters and designs are pressed into the sheet when it is made. The material is quite stable as to dimensions and no mechanical trouble is experienced because of the tendency of the material to come and go with thermal contraction and expansion. Sheet sizes available are 24 by 42 in. and 24 by 84 inches.

Another innovation for architects and designers is made available through building photo inlays into laminated sheets specified for veneers on doors, or panels used for wainscot or counter fronts. (See top illustration.) The photographs are made on a special grade of paper which can be impregnated with the same resins normally used in making laminated sheets, and the photograph becomes an integral part of the sheet itself. It is chemically inert and resistant to wear and abrasion. The background color may be any one of more than forty available but the photograph at the present time is limited to either sepia and white or black and white. Silhouettes may be used similarly.

Western Union Time was effectively dramatized by Henry Dreyfuss when he designed this new office for the company in Philadelphia. Yellow cast resin numerals were used on the clock

Symbols of industry translated in design

A DRAMATIZED telegraph office, the first of its kind anywhere and which may signalize the beginning of a new trend in the general design of stores and offices in the opinion of its creator, Henry Dreyfuss, New York industrial designer, has been opened recently in Philadelphia by the Western Union Telegraph Company. Employing principles of modern design, the traditional appearance of this telegraph office is completely transformed by the new decorative scheme and lighting arrangement.

The design of this Western Union office marks a milestone in chain-store design, according to Mr. Dreyfuss, and forecasts possible future treatment of chain stores as a unit. It is probably the first time that the symbols of an industry have been used as a decorative motif and points the way to a fuller usefulness of a store from the standpoint of advertising and sales promotion.

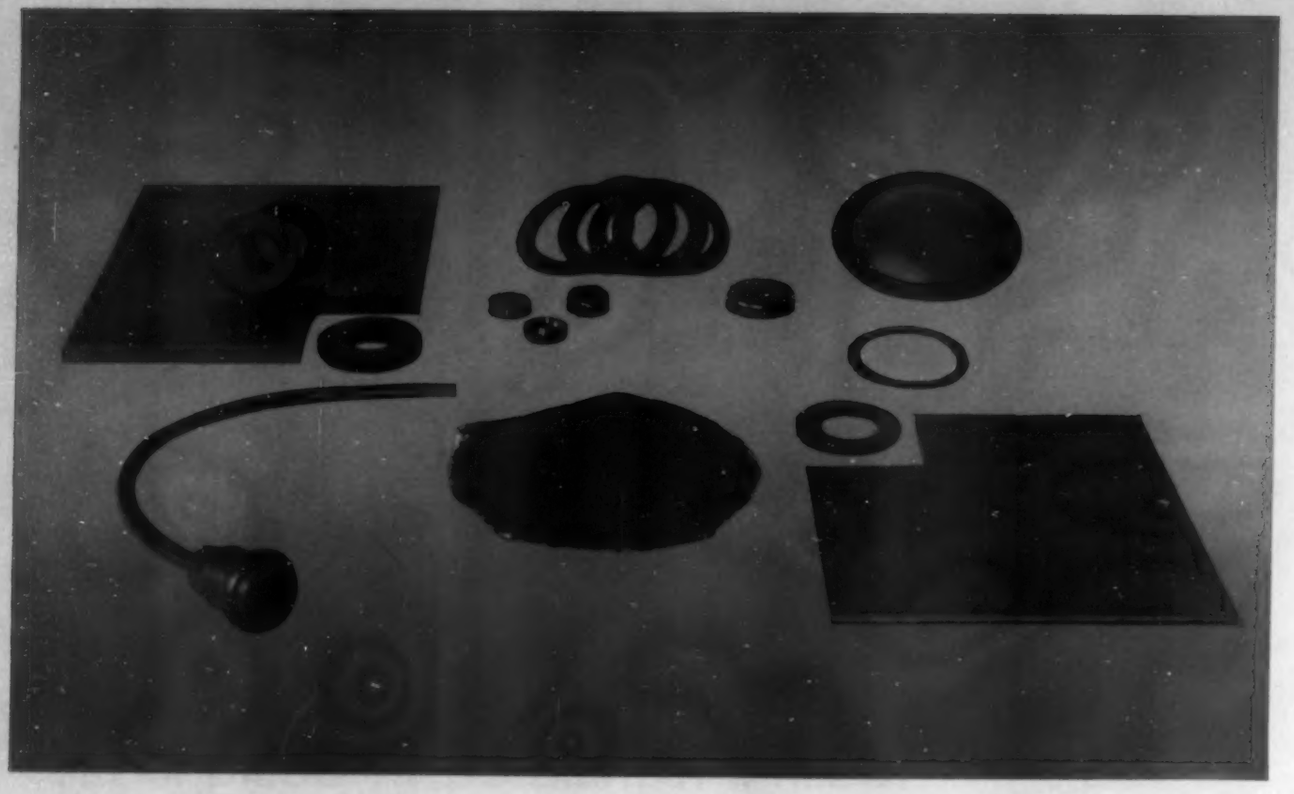
"Because speed is the essence of the business of the telegraph company, the selection of a motif to express this architecturally was only natural," explained Mr. Dreyfuss. "It has been our effort to capture a feeling of speed and efficiency and to express them in a pleasing modern design in order to accent both the activities of the telegraph office and to emphasize all the dramatic implications contained in the simple act of sending a telegram.

"Since more and more people are using the telegraph for all kinds of social communications, it has been our effort to make the office as pleasant as possible to help dispel the feeling which still exists among some people that telegrams are only used in emergencies, or in association with unpleasant events."

Certain common denominators, easily adaptable to any standard office, have been dramatized to trademark the office: Yellow blanks, a clock, use of color, lighting treatment, a distinctive special writing table and curved walls. The yellow blank and official time symbolize Western Union in the minds of most people. Catching the eye, the first thing on entering, these register "Western Union" immediately. Capitalizing on this, a large Western Union blank, 4 x 5 feet, has been placed diagonally on each side wall so as to be as dramatic and conspicuous as possible. A large clock specially designed and saying "official time" has been set above the counter directly facing the entrance to the store. Yellow cast resin numerals and polished aluminum hands effectively catch the light and stand out in bright relief against the wall.

"Our every effort has been directed to increase the speed with which messages may be handled, as well as to give the public a comfortable, pleasant and efficient place in which to transact its business with the office. Exhaustive researches were conducted in association with the telegraph company's engineers to employ every efficient device of office layout and practice," Mr. Dreyfuss pointed out.

Simple in form and plan, the focal point of the new office is the counter over which business is transacted. The rounded shell of the rear wall of the customers' lobby divides the office into two parts; the back is used for working space. Cut into this curved wall is an opening, the bottom of which forms the counter surface over which (*Continued on page 50*)



Rings, gaskets and washers may be cut from these sheets of synthetic rubber which are molded from powder already vulcanized

Synthetic rubber molding

THE United States Army Air Corps specified Thiokol, a synthetic rubber made by the Thiokol Corporation, for all its fueling station hose. The Navy, thereupon, tested this synthetic rubber fabric for gas cells on lighter-than-aircraft and learned from the Bureau of Standards that it is twenty-five times better than the finest rubber for preventing escape of helium. Commercial aviation has been equally quick to make use of this material. Gasoline tanks on the China Clipper are sealed with Thiokol coating compound which helped make possible an innovation in fuselage fuel tank construction.

The complete resistance of synthetic rubber to universally used solvents is the great reason for industry's wide application of this man-made product. Natural rubber swells and deteriorates rapidly after it comes in contact with oil, gasoline and important chemical solvents. It then loses resilience and abrasiveness—precisely the qualities for which rubber is first installed. Having a completely different *chemical* make-up, synthetic rubber is unaffected by solvents, although it has the same physical characteristics as natural rubber. Duprene, another synthetic rubber recently put on sale by du Pont, has also this advantage, but is handled and molded like natural rubber rather than being molded like plastics as is Thiokol.

This article calls to the attention of users and molders of plastics that the millions of rubber gaskets, diaphragms, packing rings and cup washers used annually can be replaced by synthetic molded rubber ones that last indefinitely. To the users, this means that the money cost, periodic disruption of service and consequent loss of operating time to replace rubber parts in engines, motors, pipe lines and printing presses is done away with. To molders, it means that without the expenditure of a single penny for equipment or specially trained labor they add to their regular work a profitable line of molded synthetic rubber goods for which there is a real demand.

This new molding compound is fabricated into finished products in the same way as are all plastics, coming in powder form. At present, there are four grades of black powder, differing from each other only in physical hardness. The new plastic is a thermoplastic, occupying in its raw state a greater volume than the solid material (3.30 to 1 approx.) It forms at a molding temperature of about 300 degrees F., under pressure of 700 lbs. per square inch. It has been found that it shrinks in molding, but that as the shrinkage is always uniform, it can be allowed for. The powder is supplied fully compounded and vulcanized. Molding it is solely a forming operation.

The material may be used in a flash or positive mold with equally good results. It takes about three minutes for the powder to flow and knit together into a smooth, uniformly strong, and highly polished prod-

uct. More time is needed, however, for pieces larger than five or six inches in depth and two or three inches in diameter. Since all trapped air escapes from the material during the molding operation it is not necessary to cool the press before opening the mold. Extensive tests on this point have shown that molded products can be taken from hot molds without pock-marking or causing porosity. The very few rejects and all flash is reground and used over again.

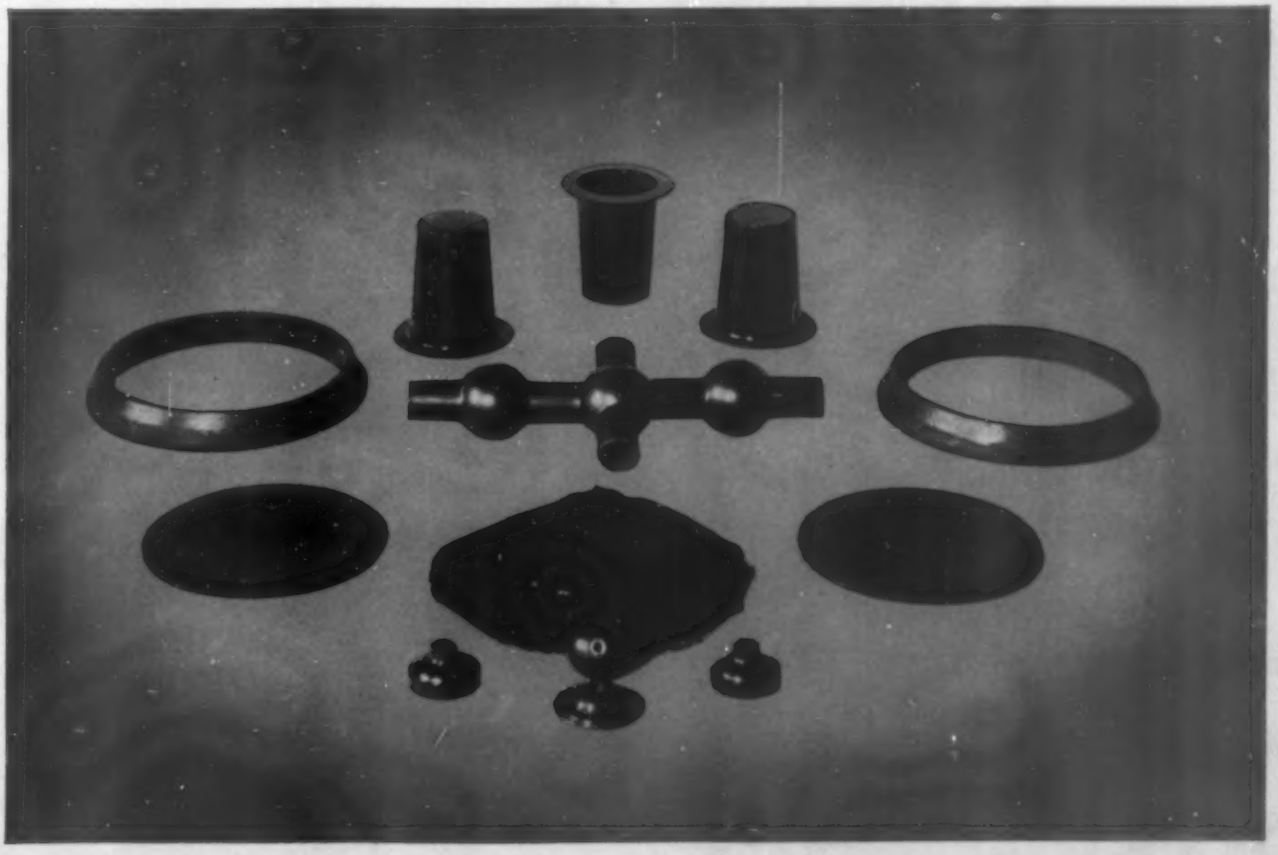
Where stamp molding is desired, sheets of the new plastic can be formed, without using a mold. Spacers are placed at the edge of the press platens and a form 1 in. wider and $3\frac{3}{10}$ times thicker than the desired sheet is used. The frame is filled level with powder and then removed, after which a plate is placed on top of the powder and the press gradually closed. One-half pound of the material will make a sheet 1 ft. square and $\frac{1}{16}$ in. thick.

Synthetic rubber molding powder is not readily preformed into blanks for loading the molds, because the powder does not cling together when pressed cold. The use of a little heat will cause the powder to form a blank but at the present time it is not felt that this procedure is economical. By weighing the powder or putting it in a measuring cup, the amount to be used is easily determined within the range of sufficient accuracy.

One prominent molder who has been working several months with Thiokol is enthusiastic about the molding powder, and has said, "I have never seen a new plastic with a brighter future at so early a time in its career. From every standpoint, synthetic rubber molding is a practical addition to the output of plastic molders." This molder has made several production samples which are shown. One of these, a cup washer measuring $4\frac{1}{2}$ in. in depth, is an illustration of the powder's free flowing properties. The flange on this piece is $1\frac{1}{4}$ in. wide and is a reasonably difficult molding. The new material flowed readily to fill the cavity and gave a smooth molding the very first time.

Similarly successful washers, packing rings and diaphragm pieces were molded, as well, but of especial interest to plastic users is the molding of a piece on a mandril larger in the middle than at the ends. This is impossible to do with other molded plastics as they are not resilient and cannot be removed from an under cut mold. Great quantities of connecting parts now made extensively of copper or iron may be molded in hard synthetic rubber because of this single characteristic of elasticity.

To sum up, these new moldings offer to industry savings in time and money. It is true that a part molded of this material still costs more than a similar natural rubber part. The long time benefit obtained in lengthened service from synthetic rubber is, however, highly compensatory. This has been the case in scores of applications in the automobile, oil, and aviation industries, and can be expected to be the same in the plastics field. Parts now made of leather and cork, in addition to rubber, have been replaced elsewhere with this new material to great advantage. Thirdly, the new plastic moldings are far better looking than other materials—a fact that develops for them a selling appeal when compared with the usual dull, black-white gaskets, etc. In (*Continued on page 49*)



Below we illustrate washer cups four inches deep, electrical parts, gaskets, and a piece molded on a mandril larger in the middle than at the ends. All done by conventional methods of plastic molding

Design at Carnegie Tech

BY PETER MÜLLER-MUNK

That designers of the future shall handle plastics with intelligence gained through intimate acquaintance, Carnegie Tech includes these modern materials in its fundamental instruction

IT seems to me that the plastic producers are still in that first enchanted stage of expansion in which the immediate demands of to-day overshadow the more complex ones of tomorrow. The rapid acceptance of plastics for articles made heretofore of wood, metal, or other materials, the use of plastics for casings of household and other machinery, have established certain definite technical properties of individual synthetics. Public response to the new fashion note of smooth surface and subtle colorings has been plentiful and favorable. The first battle has been won—plastics have arrived. Further growth, therefore, cannot depend on the mere continuation of policies so far pursued, but must concern itself with an analysis of the market as a whole and the relation of plastics to new usage fields within this market. The haphazard nibbling of yesterday will not suffice to gain the share which coordinated, intelligent effort should achieve. If the producers and molders of plastics are not merely a collection of individual factories but an industry, then the time for the pooling of common interests, a period of education and training for this new craft seems at hand. Just as the industries allied with coal, steel, and electricity have helped in the development of research departments, either under private, federal or college guidance, so will the plastic industry need similar help and stimulation in its own field. The constant practical demands of factory production leave little room for impartial, far-sighted, scientific research and design training for new developments.

Since coming to Carnegie Institute of Technology last fall to assist in the development of its industrial design courses, the growing awareness of the student body of the field opened to them by the plastic industry has been of major concern to me. The policy of the Institute in initiating the first complete course for

1. Scale model for electric lantern to be developed in either phenolic or urea. Case could be molded in two parts, the halves fitting together with a tongue and groove and held in place by two metal strips on the sides. The strips also act as guides for the handle which slides up for convenient use, yet closes down as shown when not in service. Shallow grooves inside hold batteries firmly in place. This model was designed and executed by Arnold Proellochs

2. Camera, designed by Katherine Wiegel, to be molded of phenolic or urea. Clean smooth lines predominate and a feeling of lightness results

3. Table or desk clock designed and executed by Jane Thompson. The square base block could be developed in any plastic and the clock rests free in the hollowed center so it can be turned in any direction or at any angle. Clock case is chromium plated copper; hour divisions are cast resin. The movement can be removed for winding or repair by a twist of the face plate. Clock movement in model is Seth Thomas—8-day

the professional industrial designer in any American College was based on the same standards of thoroughness and flexibility which the engineering and research laboratories had established. The faculty of the Department of painting and design, under whose leadership the industrial design courses are carried on, was loathe to add just one more class in fancy rendering to those already flourishing in other "art" schools. If industrial design was to be more than a catchword, then manufacturer and student were entitled to get more basic understanding and knowledge of the relation of art to machine production than had hitherto prevailed. It was not enough to analyze and present the fundamental theories of artistic expression—in their adaptability to modern production methods and materials remained of prime consideration. The problem, therefore, presented two major subjects: A. The purely esthetic analysis of form, line, and color and of their relation to specific materials, textures, and tools. B. The purely technical and chemical analysis of materials and of their relation to machine operation. From the solution and integration of these two, a proper and practical understanding of the relation of artist to industry and of industry to the designer could be arrived at. Carnegie Tech's industrial design courses led the student from abstract experiments in purely artistic expression to the entirely practical construction of models for mass production. Industry and the machine—as patron and tool of the artist—in much the same manner as had the church and the hand tool in the middle ages, became a logical conclusion. On the other hand, the necessity for rational design of its products as prerequisite for customer acceptance and increased profits on the part of industry, provided our teaching with more than academic foundation. *(Continued on page 51)*

4. Electric wall clock, designed and executed by Paul Perrin. Utmost simplicity of construction and maximum visibility are its chief claims of merit. The face of the model is of clear cast resin but could be developed in any transparent plastic. Numeral indications are colored strips of the same material connected on. Hands are enameled metal and a telechrom movement has been used in the model. An electric light could be concealed at the back for night visibility

5. Comb, mirror and brush set designed by Isabel Shelton. Again simplicity of line and form lift these items from the category of commonplace and make them entirely suitable companions for modern interiors. They can be developed in a wide range of plastic materials in either light colors or dark. They lend themselves particularly well to injection molding of acetate: where light and translucent colors and striated effects may be obtained without difficulty

These models were all executed with the generous cooperation of Professor F. Clayton at Carnegie Tech.

Announcing Modern Plastics Competition

PLASTICS in common with all industry are subject to the influences of good design and are more or less dependent upon it for general acceptance and satisfactory results. Design, in this sense, is not restricted to line and form alone, but includes functional design and the engineering skill requisite to the proper choice of materials and methods for appropriate applications.

The purpose of this Competition is to focus the attention of all industry upon the rapid strides made by the various plastic materials during the past year and to give merited recognition to those companies, and their engineers and designers, whose efforts have made such progress possible. Entries will be assembled under three groups of classifications, each with its separate board of judges chosen because of their broad experience in that particular field.

Important in the consideration of entries will be the inclusion of all facts pertaining to their inception, development, and results obtained. These statements of fact should be brief and to the point and should be supplemented with blue prints or sketches where such may be considered helpful in clarifying details of function and design. Such facts will be of inestimable value in the deliberation of the judges

and will simplify the subsequent announcements of their decisions. Therefore, a request is made of each entrant for a summary which will state the aims and objectives of the design submitted, what was sought and how accomplished, whether it was an original or redesign, with, if possible, a statement of its effect on sales and production problems—or other functional advantages gained through its adoption.

Details of the competition follow, and an entry blank is included with this issue. An early response from those who contemplate entering designs will be appreciated. The board of judges for each of the three groups in the Modern Plastics Competition will be announced in a later issue.

ENTRIES to the Modern Plastics Competition will be accepted from now until August fifteenth and must be confined to those plastic parts which have been designed or completed or placed in production during the year that started August 15th, 1935. No entry fee is required but it is understood that all parts will be submitted in their completed form and that all entries will remain the property of MODERN PLASTICS and will be placed for exhibition in the Permanent Plastics Exhibit at 425 Fourth Avenue, N. Y. C., from October 1, 1936 until December 1, 1936.

ANY number of plastic parts or designs may be submitted to the Competition by the following: A. Manufacturing companies making use of the design entered; B. Manufacturers supplying the plastics material from which the designs were created; C. Molder, fabricator, or laminator who produced the designed object entered; D. Machinery or tool manufacturer whose equipment was used in producing the entered designs; E. Independent or company engineers or designers responsible for the submitted design.

GROUPS or classifications comprising the Modern Plastics Competition consist of the following:

1. Industrial—for the outstanding industrial achievement in which plastics were a major factor.
2. Style—for the smartest adaptation of plastics materials to style merchandise within the form of wearables and accessories.
3. Decorative—for the most appropriate application of plastics in architecture, interior decoration, furnishings, fixtures, etc.

JUDGING of entries will take place immediately after the closing of the Competition and the awards will be announced in the October 1936 issue of MODERN PLASTICS together with a complete story and illustrations of each winning design. Three cash awards will be given to those individuals—company or independent engineers or designers actually responsible for the creation of the plastic part—whose entries achieve respectively first, second, and third highest ratings in each group of entries as follows:

First award in each group	$125.00
Second " " " "	75.00
Third " " " "	50.00

CERTIFICATES of award will be given to the companies sponsoring the winning designs as well as to the molders or fabricators, suppliers of materials, and suppliers of equipment used in their production.

THE actual plastic object accompanied by the enclosed entry blank must be sent. Only in the case of architectural and interior designs will photographs be acceptable for consideration.

PLEASE see that all information requested on the entry blank is given in detail—particularly the summary relating to the aims and accomplishments of the design. Each entry must be accompanied by a separate entry blank. If additional blanks and further information are desired they may be obtained by addressing Modern Plastics Competition, 425 Fourth Avenue, New York City.

Editorial comment

THE plastics industry, like Topsy, has "just growed" and those engaged in it have been so overburdened with work and so flooded with orders most of the time that insufficient time has been set aside for research and planned development all along the line. In my recent trip through the middle west I saw evidence of this fact on every hand. Plants running six and seven days a week—three shifts a day—and executives spending a part of each day writing, telephoning, and apologizing for delayed deliveries; and the balance of their day and half the night checking production sheets and solving the little annoying difficulties that arise under such manufacturing pressure.

Before plastics can render their greatest service to industry—before they can begin to achieve the recognition they deserve as modern industrial materials—someone must do a job of planned industrial education to impress upon manufacturers, their engineers and designers, that these materials are *new* materials and must of necessity be handled *differently* than the materials they replace.

THIS is particularly true in the matter of design. Especially structural design. Molded plastics, for example, lay no claim to strength equal to that of metals, yet in illimitable applications they are superior to metals in all other respects. For instance, metal surfaces need much costly labor to finish as well as to form. They are subject to rust and erosion. They are cold and harsh to the touch and scratch easily when finished. Plastics, on the other hand, are quite the reverse. Their finish is complete and lasting when they come from the mold. They are never cold nor harsh. They are not subject to rust, erosion, chipping or denting, and their color goes all the way through.

Therefore, where structural strength is required beyond that possessed by plastic materials alone, the part under consideration should be so designed that metal will be used for the structural member for the sake of strength, and plastics will be used to supply the housing or finish and resistance to wear. But the point is, that this should be determined in advance and the part designed accordingly.

One of the reasons why mold costs enjoy the unsavory reputation of being high is because manufacturers contemplating the use of plastics often make impossible—or at least, impractical—demands. They frequently insist upon certain details of construction that make mold costs unreasonably high and molding difficult. And their demands can usually be traced to their unfamiliarity with the materials and the methods of handling. Molds have to be rebuilt often because their original design, while satisfying the demands of the buyer, proved inadequate to the job.

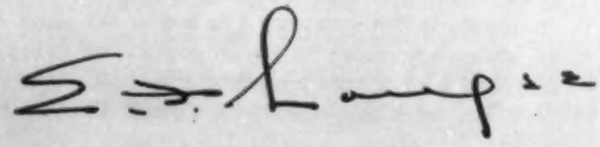
MOLDERS are sometimes reticent to argue this point to a successful conclusion because through such argument the job may be lost to a competitor who will take it on any basis and hope to come out whole in some way or another.

Industry is becoming more and more aware, however, that buying plastic parts must be done on a basis of complete frankness and confidence if anything like satisfactory and economical production is to be attained. Designers, too, are beginning to recognize the major importance of creating designs that are especially adaptable to the materials they are about to choose and put into use.

The practice of sending the same set of blue prints to molders that are sent to metal suppliers for quotations is a fundamental mistake which is still being practiced to an unfortunate degree. Seldom if ever is the design suitable and confusion and inaccurate quotations are the natural result. To remedy this, educational work among new users of plastics and those contemplating their use for the first time, must be done by those within the industry.

ON THE other hand, there are many manufacturers and purchasing agents who have interested themselves sufficiently in the handling of plastics to overcome these minor difficulties in seeking information and quotations on parts under consideration with the result that a great many new and interesting applications of plastics materials have made their appearance in recent months.

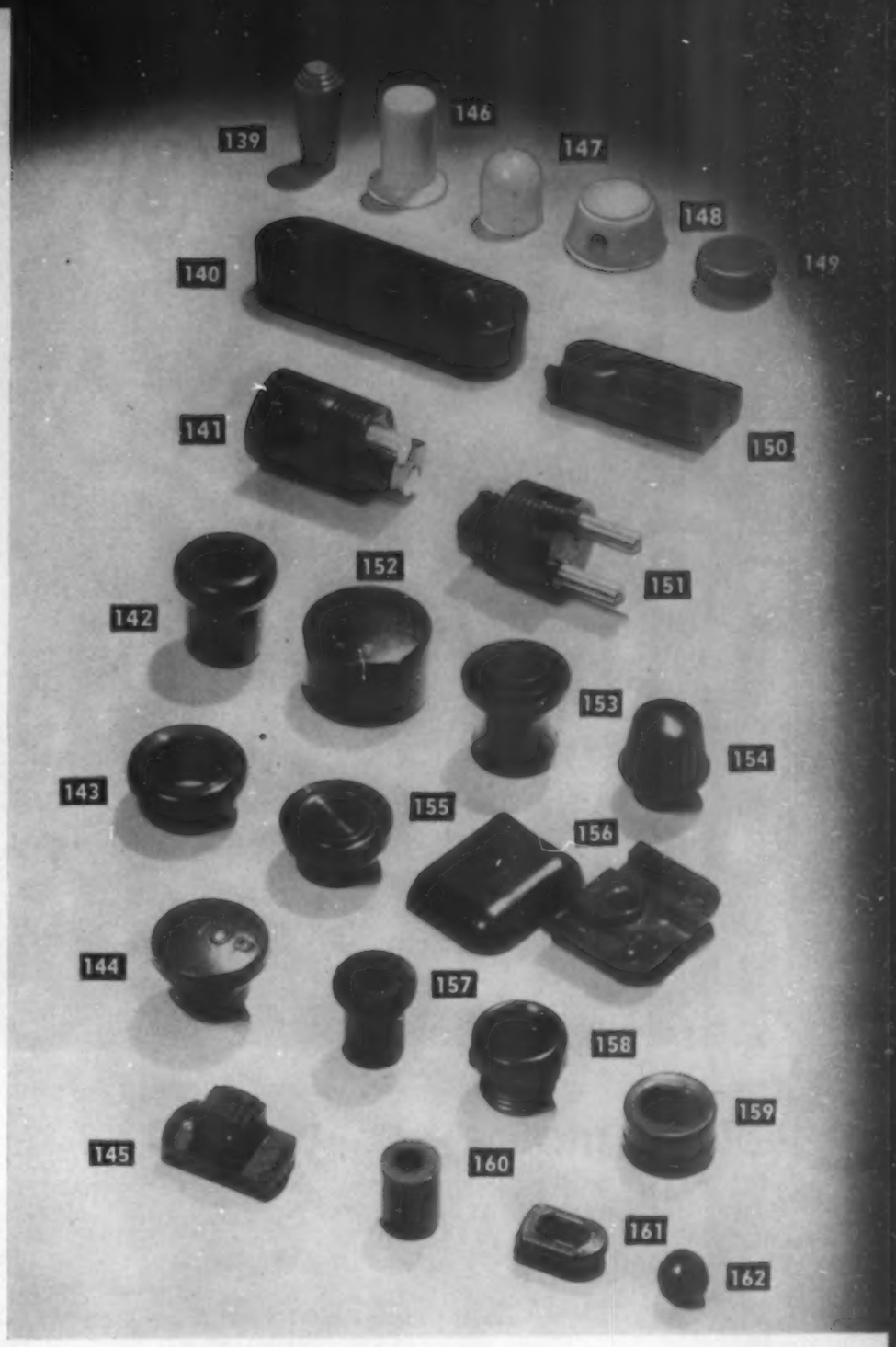
AS a first step to bring these facts to the attention of the vast number of manufacturers who are beginning to recognize the merits of plastics in their various applications, we are launching the First Modern Plastics Competition through which we plan to exhibit the outstanding examples created during the past year. Details are announced on page 22, please read them.



Stock molds

SHEET NINE

MANUFACTURERS of electrical goods and radios will find many parts available from stock molds of which a few are pictured here. In writing for samples please mention both sheet and item numbers



139. Tapering knob $1\frac{3}{16}$ in. long. Opening about $\frac{1}{8}$ in. diameter

140. Wire spacer $1\frac{3}{4}$ in. long and $\frac{3}{8}$ in. wide

141. Fitted and threaded plug half $\frac{5}{8}$ in. diameter

142. Foot $\frac{5}{8}$ in. high. Tapering hole. Diameter $\frac{3}{8}$ in. to $\frac{1}{8}$ inch

143. Bushing $\frac{3}{16}$ in. high, $\frac{3}{8}$ in. inside diameter

144. Stop button $\frac{5}{8}$ in. diameter

145. Switch button $\frac{5}{8}$ in. long

146. Shelf stud $\frac{3}{4}$ in. long and $\frac{1}{4}$ in. opening

147. Hollow lamp shield. Hole $\frac{7}{16}$ in. diameter

148. Radio knob. Opening $\frac{3}{16}$ in. diameter. Set screw hole $\frac{1}{8}$ inch

149. Knurled knob with brass threading. Diameter at opening $\frac{1}{8}$ in., flat top.

150. Plug half $1\frac{3}{16}$ in. long and $\frac{9}{16}$ in. wide

151. Plug half threaded with two brass stems

152. Push button $\frac{7}{16}$ in. high and $\frac{3}{4}$ in. diameter with threaded hole $\frac{3}{16}$ in. diameter

153. Knob with $\frac{5}{8}$ in. overall. Opening $\frac{1}{8}$ in. diameter

154. Knob with knurled sides. Opening $\frac{1}{8}$ in. diameter

155. Knob with threaded opening $\frac{1}{8}$ in. diameter, knurled edges

156. Plug, two parts, $\frac{7}{8}$ in. long, $\frac{3}{8}$ in. wide and $\frac{5}{8}$ in. deep

157. Bushing with $\frac{1}{8}$ in. hole. $\frac{1}{2}$ in. high, spool top

158. Bushing, threaded stem, $\frac{1}{4}$ in. diameter, sunken top

159. Cord bushing opening $\frac{1}{4}$ in. by $\frac{3}{16}$ in.

160. Bushing $\frac{3}{8}$ in. high with $\frac{1}{8}$ in. diameter, plain exterior

161. Cord insulator $\frac{1}{4}$ in. by $\frac{1}{8}$ in. at opening

162. Ball, opening $\frac{1}{4}$ in. diameter

Address all inquiries to Stock Mold Department Modern Plastics, 425 Fourth Avenue, N. Y. C. All molders are invited to send samples from stock molds to appear on this page as space permits

Stock molds

SHEET TEN

THE sand toys pictured above are molded of urea and are available from stock molds without initial mold costs. Premium users should be interested in samples, especially those packaging cereals or other merchandise in which an appeal to children can be made

Although originally created as sand molds they can be used for shaping jellies or party candies and for many other purposes which will suggest themselves to manufacturers with imagination. Samples will be gladly sent to those interested if they will write on business stationery specifying both sheet and item numbers when inquiring

244. Frog sand mold 3 1/4 in. by 2 1 1/16 inches

245. Elephant sand mold 3 3/4 in. by 2 7/8 inches

246. Rabbit sand mold 3 1/8 in. by 2 3/4 inches

247. Owl sand mold 3 1/8 in. by 2 1/2 inches

248. Monkey sand mold 3 in. by 2 3/8 inches

249. Duck sand mold 3 1/2 in. by 2 7/8 inches

Address all inquiries to Stock Mold Department Modern Plastics, 425 Fourth Avenue, N. Y. C. All molders are invited to send samples from stock molds to appear on this page as space permits

WORTH FILING

Down in Tennessee

UNSCRAMBLING a tree to make it give other than its natural fruit has long been done but it remained for the chemical industry to discover the versatile nature of its ingredients and put them to such diversified uses that ordinary citizens are frequently mystified with the result. It is difficult to believe that there is such close relationship between the films upon which photographs are made, for instance, and the soft sheer fabrics worn by the attractive girl seen in such photographs. And who would believe that from the same genesis, perhaps from the same tree, came the smooth lustrous knobs on the dash controls of your car, or the steering wheel itself?

These discoveries have been the means of providing industry during the past decade or two with brand new materials of exciting importance and the incidental growth and expansion of a brand new industry as well. This new industry has to do with the manufacture and conversion of cellulose acetates which through different processes of conversion and fabrication have given users of plastics a strong lustrous colorful basic material both for molding and stamping.

To illustrate this growth and expansion let us look in upon the Tennessee Eastman Corp., the Eastman Kodak Co.'s subsidiary among the mountains of eastern Tennessee which has developed into a cellulose acetate plant supplying the needs of the largest photographic industry; manufacturing a substantial share —the second largest—of America's acetate yarn; and pioneering in the rapidly growing field of plastics.

For the diversity of its acetate enterprise, for the adaptability with which new materials have been produced as their production was required, for the ingenuity with which by-products have been marketed, Tennessee Eastman commands interest. This accomplishment, in the best tradition of the modern American chemical industry, seems a worthy concomitant of the now famous decision of the Eastman management to proceed with plans for launching the expansion at Kingsport in the face of the depression.

Eighty buildings stand on the plant site of 372 acres beside the Holston River. They house processes that carry into practice, on a vast scale of production, the results of experimentation with cellulose acetate begun at Rochester as far back as 1908. They house as well the wood-chemical industry, representing Tennessee Eastman's beginnings, that supplies acetic anhydride for Kingsport's cellulose acetate and methanol for Rochester's cellulose nitrate film.

Perhaps it would be well to go back to 1920, when Tennessee Eastman was organized, and to 1921, when operations began. The original reason for the establishment of the Tennessee subsidiary was the Eastman Kodak Co.'s need for a large and dependable source of supply for methanol to use as a solvent of cellulose nitrate. Passing over the several stages of development of the most practical possible wood-distillation process to produce it, let us examine briefly the economy built up around methanol production at Kingsport in the 1920's. It is an indicative part of this history.

The first step in establishing Tennessee Eastman's position was the acquisition of timber land, or timber rights, in Tennessee and three adjoining states, amounting to more than 40,000 acres. From these tim-

Aerial view of the Tennessee Eastman plant at Kingsport

ber resources, they commenced cutting hardwood lumber of numerous varieties that were to find many uses —interior trim, flooring, furniture, railroad construction, ship-building, automobile bodies, wheels and caskets among other things.

But lumber, bulky though the output might be, was only a by-product. A steady supply of tops and limbs from the timber operations, of slabs and ends from the saw mill, and of otherwise valueless trees from the timber holdings, was the primary object of the forest operations. What is waste in many lumber businesses became raw material for this chemical plant.

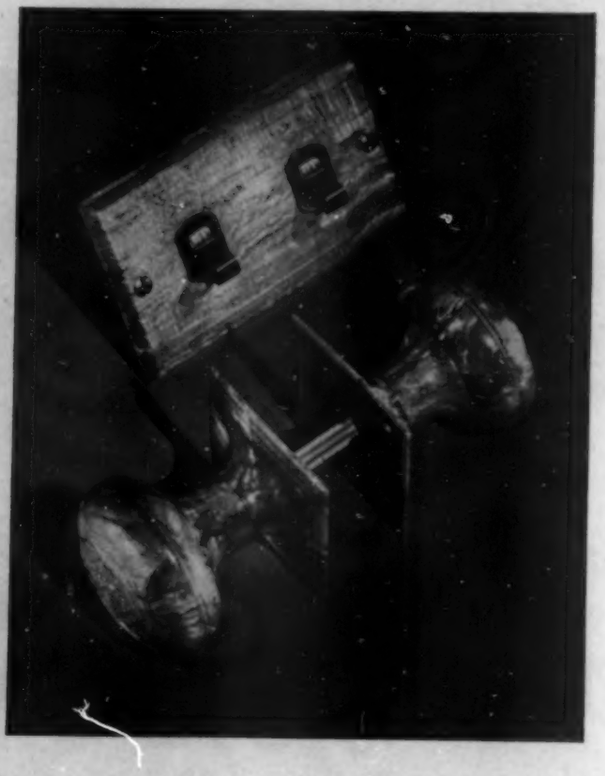
This "chemical wood" went into the retorts and emerged as charcoal, after the crude distillate—pyroligneous acid—had come off. Even today, although this is one of the country's outstanding cellulose acetate plants, the sale of charcoal, typical of the by-products, receives due attention in the integrated economic scheme on which the success of the company is built. Charcoal in various grades is sold for industrial uses, and any surplus finds a ready market among Negro washerwomen in the states south of Tennessee who through field work have been shown the advantages of cooking, washing and ironing with firepots in the shade out of doors instead of sweltering beside their stoves indoors.

Charkets, briquetted from charcoal dust, became one of the most successful by-products. Many important railroads use them for boiler service in dining cars. Steamships and hotels find them equally desirable. They are used, too, to heat refrigerator cars going North during the winter and to provide heat for curing high-grade tobaccos.

Charcoal thus disposed of, there were other by-products in the distillate to be disposed of before the methanol could be piped with complete economy into cars for shipment to Rochester. Wood oils, for instance, have become largely consecrated to wood preservation and have supplied valuable ammunition for the battle of extermination of the celebrated termite.

Tecsol, a non-poisonous denaturant and another by-product, is specified in a government formula for

Above, vanities are smartly fashioned of colorful acetate
Below, is illustrated a variety of versatile applications



Above, shock-proof molded door knobs and switch plate which offer an illimitable range of color combinations for modern interiors

At left, golf tees, combs and goggles are made equally durable and attractive through the use of acetate. From typewriter keys to automotive accessories, including steering wheels, indicates the wide range of practical applications

denaturing ethyl alcohol in paint, varnish, lacquer, and in radiator antifreeze.

In the beginning, the acetic acid fraction of the crude wood distillate was taken off as calcium acetate and that substance was sold to other industries. But in the late '20's, things were happening in Rochester which later altered this program and promulgated a vast plan of expansion.

Home movies, introduced in 1923, were gaining rapidly in popularity. This gain was reflected in a persistent demand for safety film in place of the inflamable films in use at that time. Safety film, too, was of tremendous advantage for X-rays stored in hospitals and its necessity became rapidly apparent. The Eastman Kodak management saw that the manufacture of cellulose acetate for these purposes must be put on a large and permanent basis, and the Tennessee plant was chosen as logical medium.

This decision converted one more by-product of the Tennessee plant to use in the manufacture of photographic materials. Production of calcium acetate was discontinued and acetic anhydride was made instead. Acetic anhydride and glacial acetic acid, treating cotton, which was available from sources within economical reach of Kingsport, form cellulose acetate.

Within extremely rigid specifications, the cellulose acetate process is a model of large-scale chemical manufacturing under precise control. Like Kodak Park, Tennessee Eastman's cellulose acetate plant carries on test-tube operations in trainload lots.

The capacity for making cellulose acetate has been expanded to the point where it is ten times that of five years ago when production began. It has given the X-ray, as well as professional and amateur photographers, safety film at no extra cost to them. It has satisfied the parent company with a dependable source of supply. And besides this, it has entered enthusiastically into the production of essential ingredients for the rapidly growing plastics industry.

The non-photographic materials processed by the company from a large part of its cellulose acetate output should in no sense be considered by-products. Although safety film furnished the inspiration for cellulose acetate at Kingsport, and sets its standard of quality, other products made from it have assumed major importants as well. (*Continued on page 61*)

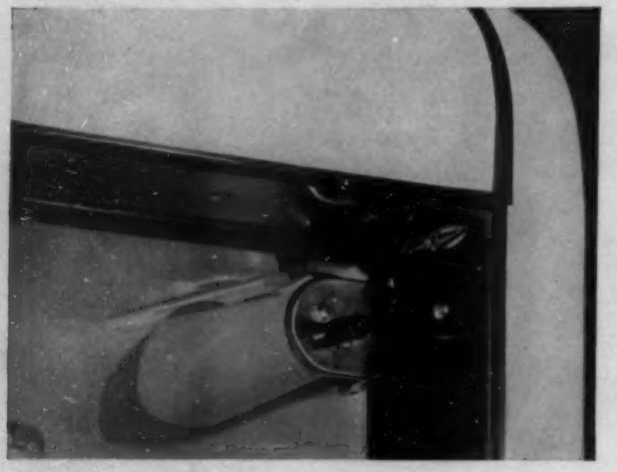
PLASKON

FOR APRIL 1936

REFRIGERATOR FITTINGS:

Last year Kelvinator had interior lights and they made such a hit with housewives that 1936 models are similarly equipped. It seems as though we're always reporting a lighting application of Plaskon. Last month it was the new Wakefield "Commodore" unit; the month before, the Flash-O-Lens Magnifier. The electrical industry is finding Plaskon's characteristics of fine translucence, beautiful color and light-weight a perfect formula for reflector material.

You perhaps know that the Kelvinator light goes on when the door opens, shuts off when it closes. You probably don't realize, though, that the smooth, pleasant-to-touch door-handle is light ivory Plaskon,



and is brand new with 1936 (as are the two ivory hinge guards which, with the handle, accent the streamline of the cabinet).

The Kelvinator cabinet—designed with the aid of Count Alexis de Sakhnoffsky—has brought new beauty into the kitchen. The share Plaskon fittings contribute to that beauty exemplifies the wide application of Molded Color as the plastic most adaptable to modern design.

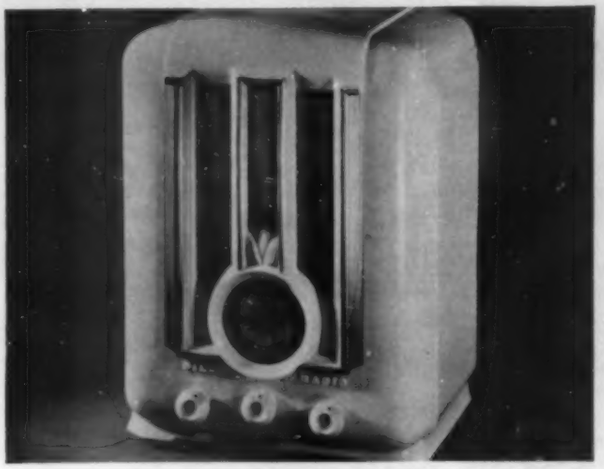
The Kelvinator parts in Plaskon are molded by Chicago Molded Products Corporation of Chicago, Illinois; Norton Laboratories, Inc. of Lockport, New York; and Richardson Company of Melrose Park, Illinois.

Of more than passing interest is the use of Plaskon and chromium on the door handle—a combination being used for many of the newer household fittings.

Are you receiving "Plaskon Parade" regularly? The house organ of Plaskon Company, Inc. appears bi-monthly and makes (we have been told) interesting plastics reading. With plenty of pictures in color. Write today and become a FREE subscriber.

RADIO CABINETS:

The Pilot Radio Cabinet—like any beautiful molded plastic piece—is a happy union of correct design, molding skill and adaptable material. It was Mr. Jan Streng who foresaw that the radio



cabinet you see would be practical, good-looking and eminently in tune with our times. The molder, Associated Attleboro Manufacturers, Inc., of Attleboro, Mass., put Mr. Streng's design in steel, constructing the precision tools from which one Plaskon cabinet after another emerges, each exactly the other down to the thousandth of an inch. Plaskon's part of the job was furnishing lovely colors that do not fade; non-peeling and non-chipping surfaces, and high insulation for the contacting metal parts.

In the creation and development of your product, Plaskon Company, Inc. can, perhaps, help. The wide experience of our research department is a benefit that is always available, without obligation.

DECANTER CLOSURES:

The Mohawk Liqueur Corporation may not have had it in mind to provide amateur electricians with handsome lamp bases, but that is a recommended use for their gay, decorative decanter bottles. After

the contents have been appreciated, that is. While the glass bottles are serving their primary purpose by catching purchasers' eyes and preserving a liqueur, the contents are protected by smooth, strong, even thread Plaskon closures.

An interesting point about the job was making the caps exactly match the exotic colors of the decanters. This was a requirement with which Plaskon's unrivalled range kept easy pace—just as Plaskon's tensile strength and durableness satisfied the need for those qualities.

These "Artmold" closures in green, red, blue, orchid and cherry Plaskon are molded by the Plastics Division of the Armstrong Cork Products Co.

MOLDED COLOR

PLASKON COMPANY, INC.

TOLEDO, OHIO

CANADIAN AGENT: CANADIAN INDUSTRIES, LTD.

developments of the month

1

2

1. The gentleman in the picture is using a new Glow Tip lighter, featured by Cooley Electric Co. Housed in a black Durez case, the lighter has a red Plaskon knob which, when depressed, heats the resistance unit. Molded by Plastic Moldings Corp.

2. Here is what might almost be called a "non-spill" pitcher, which is sphere-shaped and comes in polished chromium with either a lapis blue or ivory Catalin handle. It may also be obtained in a set that includes a sugar sphere. Designed and manufactured by Chase Brass & Copper Co.

3. This small compact Lynn model barometer is designed by Mac Cowan for Fee & Stemwedel, Inc. The case is Bakelite molded in a choice of colors, including walnut, red and black. The two-tone dial is simplified for easy reading, and the barometer may be adjusted for altitudes up to 3500 feet.

4. This sugar dispenser for kitchen or dining room has a Beetleware top, molded by the Northern Industrial Chemical Co. for the Gordon Mfg. Co. The chromium ball is held securely in place when the dispenser is not in use, so that the contents are kept clean and dry.

5. Right in line with the current knitting vogue is this collapsible yarn holder of Pyralin which is flexible enough to accommodate a ball of yarn, and is made with a looped cord which allows container to hang from the wrist. Manufactured by Joseph H. Meyer Brothers.

6. The new Hollywood Contract Score reduces ramified versions of bridge scoring to accepted official rules. A twirl of the proper wheel brings the exact score instantly to view. It is made by Gwen and Co. The jet black base of Bakelite molded holds the score pad and contains a special groove for a pencil.

7. Iced drink mixers of polished chromium with gay blue and green leaves in Catalin make excellent bridge prizes and are sold in a set of four. They are designed and manufactured by Chase Brass & Copper Co.

8. Stellarscope, an ingenious instrument invented by Professor Walter Bartky of the University of Chicago, consists of a strip of motion picture film, a lens in a Bakelite case and a pencil type flashlight. Through it the complicated constellations of the heavens are viewed on a motion picture film, illuminated and magnified. The roll of film has 24 sky maps, some of which will fit almost any section of the heavens that can be seen with the naked eye.

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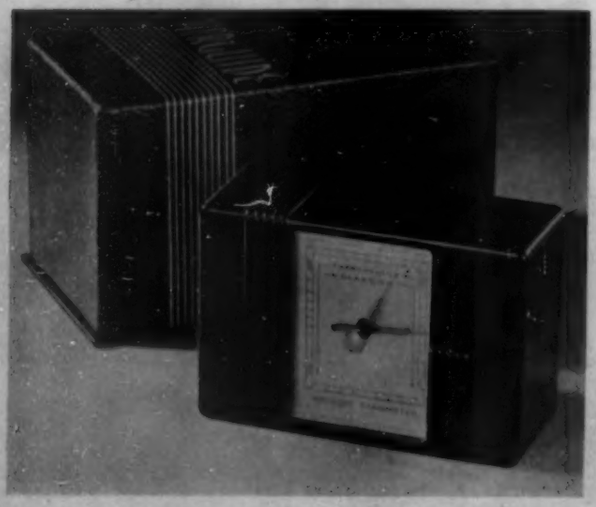

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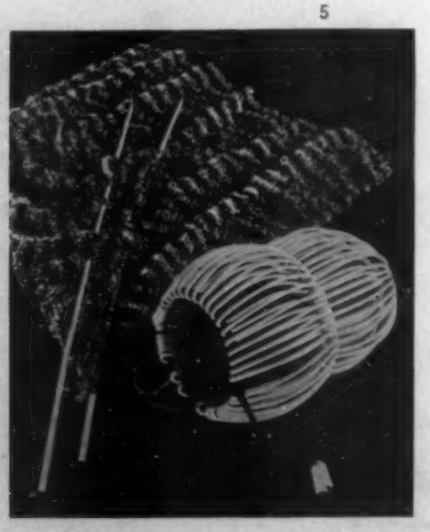

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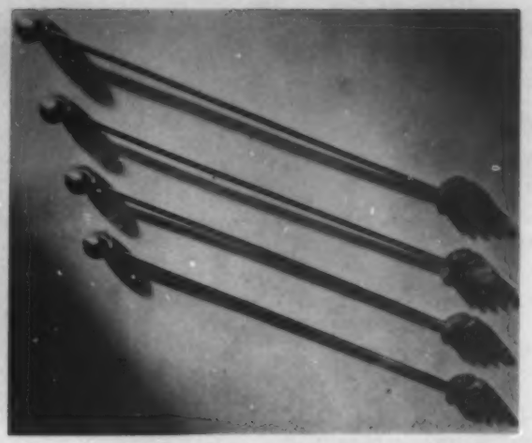

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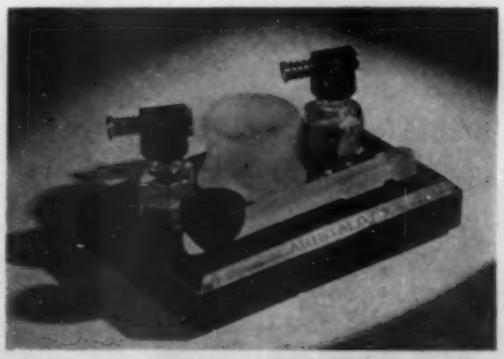
9. The adjustable Aristaloy dispenser is an assembly of Bakelite that provides a base for the dentist for centralized preparation of fillings. The very tricky molded closures on the bottles incorporate adjustable plungers permitting the dentist to regulate proportions of alloy and mercury to suit requirements. Molded by Boonton Molding Co. for Baker & Co.

10. The Leich Electric Co. presents this all-molded telephone desk set, which instead of the usual cast metal base, has a one-piece molding of black Durez. The molded base matches the molded handset more accurately than former models, gives a permanent chip-proof lustre and costs slightly less than the usual metal casting. Molded by Chicago Molded Products Co.

11. Containers for food in glass or enamel are being replaced in modern kitchens by these Beetleware refrigerator boxes. Gay in color, light in weight, non-shatterable, the boxes will not absorb or give off odors or tastes to foods, and are so designed that they may be stacked, for economy of space in the refrigerator. Molded by the Northern Industrial Chemical Co.

12. These attractive cigaret and vanity cases are manufactured by the Rex Products Corp. The vanity contains a novel type insert sifter and a down puff. Both are translucent Catalin in amber, with gold catches.



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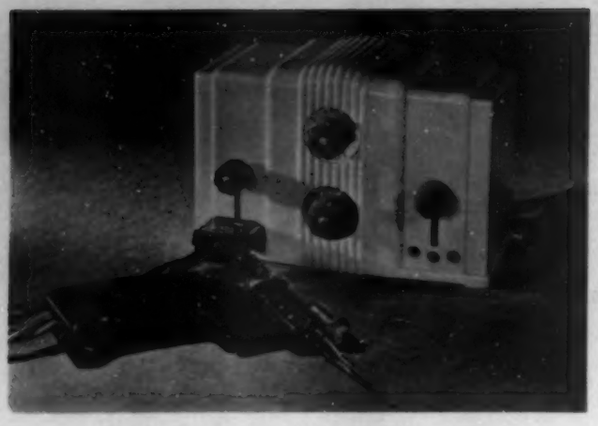
Clean, sanitary and durable is this overbed lamp shade of molded urea which may be sterilized by boiling



The new comprex electrical cautery with molded white case of urea and molded handle of black phenolic

Plastics in hospitals

BY E. R. BULLOCK

In which a big market for little plastics is pointed out, together with sensible suggestions for a successful selling attack

WITHOUT fanfare of trumpets an industrial colossus, with dignity and with mercy goes quietly about its business, the business of life-against-death. This giant, hospitalization in the United States, often debt-ridden, of necessity tax-supported or endowed, unnoticed by the layman until he has a pain, ranks among those whose expenditures run yearly into the hundred millions.

Last year, it is estimated, there were as many persons in hospitals each day as were living in cities the size of St. Louis or Baltimore; that one out of every sixteen persons was admitted to a hospital; that nearly 7,500,000 persons passed 303,288,755 days, or 830,928 years in hospitals. Such an amount of hospital traffic is not easily conceived. When further estimates reveal that forty-five per cent, almost half, of the 3,000 counties in this country now have no hospital service for general community use, one cannot fail to realize that here, at least, is one construction and equipment market that is not likely to reach a saturation point during the lifetime of any of us.

Last depression year 6500 hospitals in the United States spent $150,000,000 for new construction, and $108,000,000 for modernizing buildings and equipment; this year (with the aid of W. P. A. and P. W. A. appropriations, figures on which are not yet available) will see an increase in construction, modernization and equipment by both voluntary and tax-supported hospitals. Consider that plastics, more than any other materials, except steel, cement, etc., are naturally fitted to answer the construction, furnishing and equipment needs of the modern hospital. Unavoidable, then, is the conclusion which the past year or two in hospital development substantiates beyond all doubt. Plastics have an enviable "in" on this vast market which manufacturers will find worth cultivating.

The whole direction of today's hospital planning is to depart as much as possible from the cold, uncompromising and often dreary aspect of yesterday's institution. Hospital architects are now devoting a great deal of space to attractive reception rooms, comfortable solaria, inviting recreational halls. Formerly their chief interest was to provide only for the greatest number of accommodations. Waiting rooms in clinics, where hospital traffic is most congested, are especially improved. The persons responsible for interior decoration and furnishing stress the importance of making a hospital an embodiment of light and life, not dread and death, by seeing to it that a cheerful atmosphere, solicitous of mood and comfort, prevails. The impetus of this transformation lies as much in established medical fact as in the general improvements in construction and equipment now available. For it has been truly determined in many, many cases on record, that a sympathetic environment is often of as much benefit as the prescribed medical treatment.

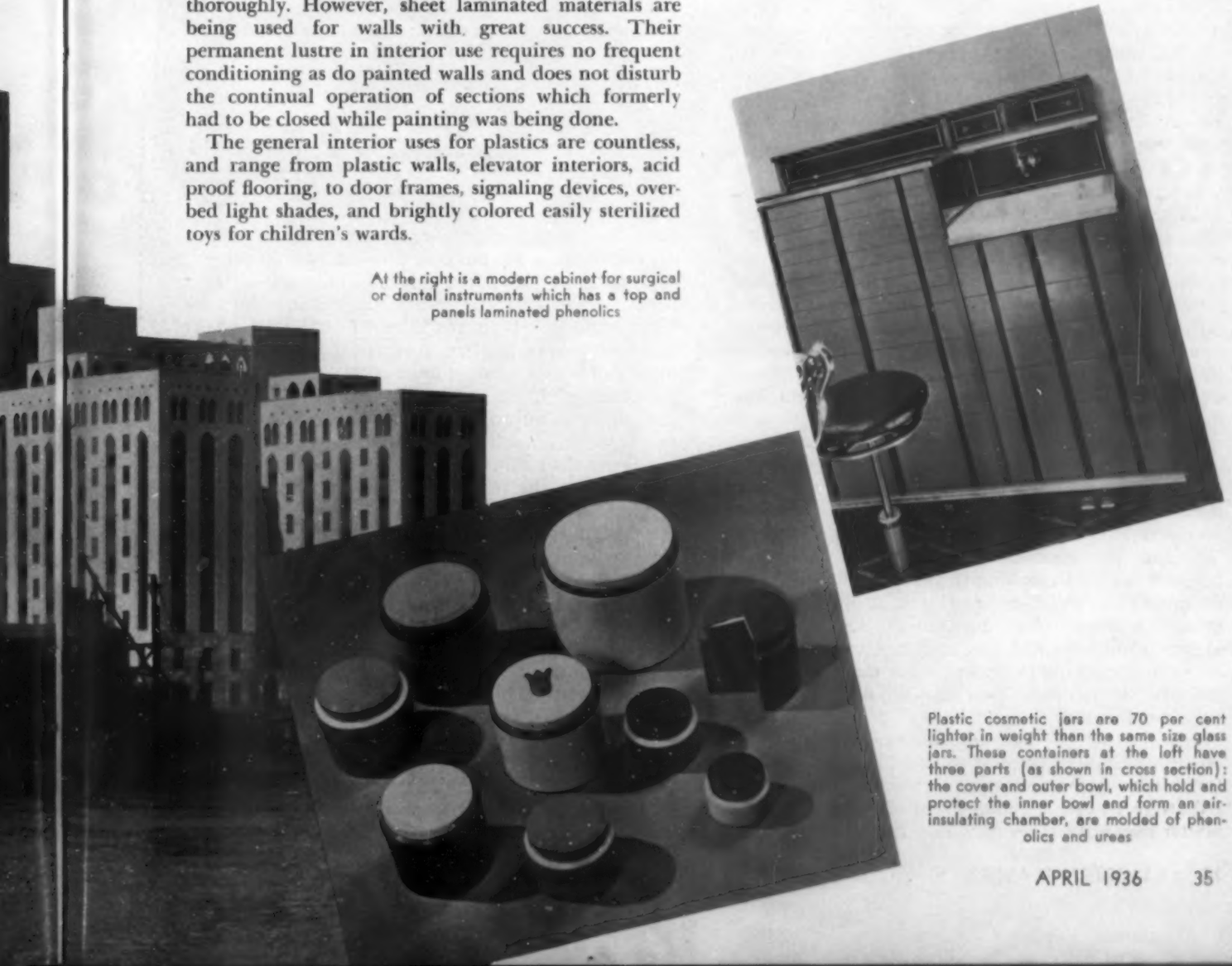
The building construction and equipment uses of plastics for hospitals depend on their economy, their durability, and for interiors, upon their sanitary qualities. Some plastics are inherently aseptic due to the compounds from which they are made, and are easily kept in a sterile condition. The use of sheet laminated plastics for exteriors will not be elaborated here; this is one phase yet to be developed more thoroughly. However, sheet laminated materials are being used for walls with great success. Their permanent lustre in interior use requires no frequent conditioning as do painted walls and does not disturb the continual operation of sections which formerly had to be closed while painting was being done.

The general interior uses for plastics are countless, and range from plastic walls, elevator interiors, acid proof flooring, to door frames, signaling devices, overbed light shades, and brightly colored easily sterilized toys for children's wards.

More thought is given now to the well-being engendered in a woman patient who wants to look her best even on the sick bed. Formerly the utmost she could hope for in beauty care was a scrubbed face and brushed hair and, if she insisted, a little talcum powder for her nose. In the more expensive private hospital rooms, in exclusive convalescent and nursing homes, many an aid to feminine beauty is found. Not the least of these are cosmetic containers, 70 per cent lighter in weight and therefore easier to handle than the same size glass jars. The container has three parts; the cover and the outer bowl, which hold and protect the inner bowl and form an air-insulating chamber, are of molded urea. These containers, and other beauty aids are sanitary, have the prime value of acid resistance, and due to their wide range of color can fit into any decorating scheme.

Almost all plastics on the market have some specific use in hospitals. Laminated phenolic materials are serving well as door casings, baseboards which are hollow for enclosing conduits, and rolled window stools. They are also used extensively for overbed and bedside table tops. In the realm of lighting, which has such an important part in hospital equipment, Wakefield "Commodore" lighting units with 19-inch urea reflectors are rapidly gaining favor.

In X-ray equipment the *(Continued on page 57)*



At the right is a modern cabinet for surgical or dental instruments which has a top and panels laminated phenolics

Plastic cosmetic jars are 70 per cent lighter in weight than the same size glass jars. These containers at the left have three parts (as shown in cross section): the cover and outer bowl, which hold and protect the inner bowl and form an air-insulating chamber, are molded of phenolics and ureas

Color—and its relationship to price

BY D. A. DEARLE

With a dash of algebra and a flair for example, a molder explains why plastic parts of light colors cost more than those that are dark

IT HAS been only during the past few years that we have become fully aware of color and the prominent part it has played in stimulating the sales of various lines of merchandise. By its gradual adoption, however, innumerable articles, which otherwise might have been forced off the market altogether, have managed to maintain an important place in the industrial field. Leather goods, for example, which were usually black or brown are now to be seen in attractive pastels or even variegated combinations. Deep reds and cheerful blues have likewise supplanted the more dismal blacks and grays in other merchandising directions and in almost every instance the change to lighter shades, has caused sales on a great number of articles to rise at a most encouraging rate. It is no wonder, then, that the enterprising industrialist has resorted to the use of color as a means of bringing his product to the constant attention of the buying public.

In the mind of the average individual, the color of a commodity is very seldom associated with its selling price. In other words, when purchasing an article one is usually not inclined to connect the value of that article with its color, and whether it be a vase, a kitchen clock, or a camera the price regardless of color is naturally assumed to be the same. Under the circumstances it becomes a difficult task to convince the average buyer of plastic products that a price variation exists in accordance with the shade he selects. There is a differential, strangely enough, being governed chiefly by the selection of its constituent pigments, and especially in the molding industry do we find this condition to be true. As a matter of fact in this field there is almost a fixed relationship between cost and color of the items produced.

Plastics, of course, are now available in an almost infinite number of shades and very often molded products buyers make the request for a change in their specifications from black or brown to one of the brighter shades. In making this change, however, they do not expect to have the price of their product increased, and very often question the source of their supply when informed that a change in color means a rise in the selling price. In lieu of the fact that the majority of their other purchases are not restricted to certain colors they are unable to reconcile an increase in the buying of their plastics requirements. Consequently, it may be well to investigate the reasons for this surcharge and ascertain the factors that contribute to its cause. Perhaps a brief glimpse into the matter may serve as an enlightenment to the prospective buyer and explain the different processes which in turn necessitate a higher price for molded products whenever color is called for to replace the darker hues.

Of course it first should be made clear that comparison is being made between the regular phenol formaldehyde group of materials (which include the blacks and browns), and the pastel shades produced by the urea formaldehyde combinations. It must be kept in mind, too, that the darker hues of practically every color are available at a price not much higher than the popular black, but the translucent greens or shades of ivory are the colors which are comparatively expensive both to molder and buyer.

In the first place, let us consider the raw material. Is there any difference in price? Decidedly, there is. The average price of a regular wood flour black material is in the vicinity of eleven or twelve cents a pound while a pound of ivory urea powder costs approximately thirty-three cents. So we immediately recognize a raw material difference of almost 300 per cent. In every molded item, however, there is a variation in the proportion of material to labor and therefore no constant can be applied in order to reach the difference in selling price. So far as the allowance for flash or difference between gross and net weight is concerned, there is no need of making comparison, for this is governed solely by the type of mold that is used. There is a slight difference in the specific gravities of the two materials but not enough to noticeably affect the price. The urea group averages 1.40 while the usual run of phenol powder is about 1.35. We must next investigate the labor of pressing and finishing.

In most instances, the time of cure in molding a urea powder is slightly greater than that needed for regular black. Where, for instance, the cycle time is three minutes on an item made of a phenol powder, three and a half minutes must often be allotted for a pastel material. This means that the cost of pressing the pieces is approximately 15 per cent. more. Of course, with some items, the time runs higher and a few lower than this, but 15 per cent. is a fair average to use. From the pressing department the piece goes to the finishing room, where innumerable operations are performed depending upon the general nature of the product. Whether it be grinding, punching, drilling or tapping, however, there is not sufficient difference in either of the materials to reflect any difference in the cost of these activities. Final inspection of the pieces, though, is another matter, for there are always more rejections to be found in an ivory colored production run than on a regular order of black. The reasons for this are evident, for in the first place dirt and dust particles are nearly always in evidence in the molding room despite precautions taken to eliminate them, and these specks manage to make their appearance in the finished pieces.

Absorption of foreign (*Continued on page 53*)

Knife sharpening–new style

BY FRANKLIN E. BRILL

"A pound of sirloin? Yes ma'am." Mr. Schmidt gropes for a whetstone, finds it dangling by the leg of the chopping block, looks out the window and absently scrapes his blade back and forth. "Warm for April, eh?"

That's meat-cutting technique–old style. Much as we may like it, modern efficiency rules it out. Those few seconds of groping and scraping with a dangling whetstone may not mean much in a country meat market, but multiply them by ten clerks–a hundred times a day–in a modern chain store, and you have a serious economic waste.

Knife-sharpening–new style–involves phenolic plastics. Shown here for the first time is the Carborundum Company's new Duo-Stone sharpening set: a device growing out of the needs of a modern high-pressure chain store. The entire housing and cover of the sharpener is molded in smooth glossy black, with a die-cast metal part holding the two stones on the revolving shaft. It's a large, rugged molding, and gets a lot of shoving and handling in a busy store.

The principle of the device is to have one of the two stones–of varying particle size–constantly immersed in an oil bath. A turn of the knob brings the other stone out of the bath into working position, with the oil coating already there. A few whisks of the knife across the stone, with the blade held at the proper angle, gives it a keen edge. The oil level is maintained by pouring it into the well when the stones are in vertical position.

Carborundum Company's first work on the Duo-Stone goes back many moons, (*Continued on page 49*)

Detroit meeting of the S. A. E.

THE dinner meeting of the Detroit division of the Society of Automotive Engineers, held at the Book-Cadillac Hotel on March 16, was devoted to the development of Aeronautic and Body Activity under the direction of A. J. Neerken, vice-chairman. About 350 engineers and student engineers were present. Dinner over, the speakers were introduced by Frank S. Spring, styling engineer of the Hudson Motor Co., who acted in the place of Mr. Neerken who was unable to be present.

Lessiter C. Milburn, vice-president and chief engineer of the Glen L. Martin Co., Baltimore, Md., was scheduled to give a talk on "Design and Development of the China Clipper Ships." Unfortunately Mr. Milburn was called to Europe the day preceding the meeting, but his paper was ably read by Dr. Peter Altman, chairman of the Governing Board of the S. A. E. The talk was illustrated with lantern slides which showed many scenes taken during the development of these world-famed ships as well as a number of slides showing construction details.

The paper was preceded by a half-hour talk on "Recent Trends in the Application of Plastics," by E. F. Lougee, editor of MODERN PLASTICS, New York. Mr. Lougee had actual samples of many of the recent outstanding developments and used these to illustrate his remarks.

"To begin with," said Mr. Lougee, "the plastics industry is comparatively new. Although celluloid was discovered some seventy years ago, and Bakelite, twenty-five years ago, the process of discovery is still going on and will doubtless continue to do so because there appears to be no end of new formulas. Each day new names for formulas appear—each one harder to spell and more difficult to pronounce—and while this is sometimes discouraging and confusing to the layman, engineers are constantly on the alert for new plastics which will fit their exact requirements and help them in the solution of some of their experimental work."

Mr. Lougee then enumerated some of the formulas already well-known and gave an idea of the vastness of the present available supply of these materials and their numerous applications.

"It would be dangerous to attempt to predict to just what extent automobile manufacturers will find plastics available for the solution of existing problems, and it would be stupid to suggest that plastics offer a cure-all to these problems. It is safe only to say that there is ample evidence that engineers and designers in many fields are interested in these materials and have shown a disposition to study their possibilities seriously."

The Toledo Scale, which is a typical example of an engineering problem recently solved through the use of plastics, was shown and the history of its development cited. It was pointed out that not only was the new scale a better one than its predecessor, but that although much more expensive materials than formerly were used in its construction, the costs in direct labor were reduced to such an extent that the new scale was actually cheaper. Furthermore, its weight was reduced from 165 lbs. to 55½ lbs., which results in additional savings of packing and shipping costs which are obvious.

Other examples such as spinning-buckets used in the manufacture of rayon, laminated bearings used in steel, paper, and other mills, truck wheels, and breaker strips for refrigerators were shown. A number of other large and difficult moldings were explained along with examples of extrusion molding of Polystyrol which were illustrated by samples from a German molder.

The development of new clear sheet plastics was amply illustrated and explained and much interest was shown by the automotive and aeronautical engineers in these materials. Their lighter-than-glass characteristic, together with their splendid optical qualities make them particularly suitable to aircraft construction.

Looking into the future a bit, Mr. Lougee pointed to the rapid strides that have been made by all automobile manufacturers in body design, especially exterior body design.

"But why," he asked, "do automobile interiors follow the century old custom of padding interiors with dust-filled fabric? This is a hangover from the carriage-age and if you will go to Montreal or Bermuda and ride in one of the horse-drawn carriages still in use there you will see what I mean. Or, if that is too far away, you may go out to Greenfield Village, where Mr. Ford is investing a great deal of time and money to preserve for future generations a picture of American life a generation ago. There you will find horse-drawn carriages of the vintage of 1880 and before, with sides and ceilings carefully padded and quilted much the same as the interiors of 1936 automobiles. The only other medium of human transportation that follows this practice is the coffin.

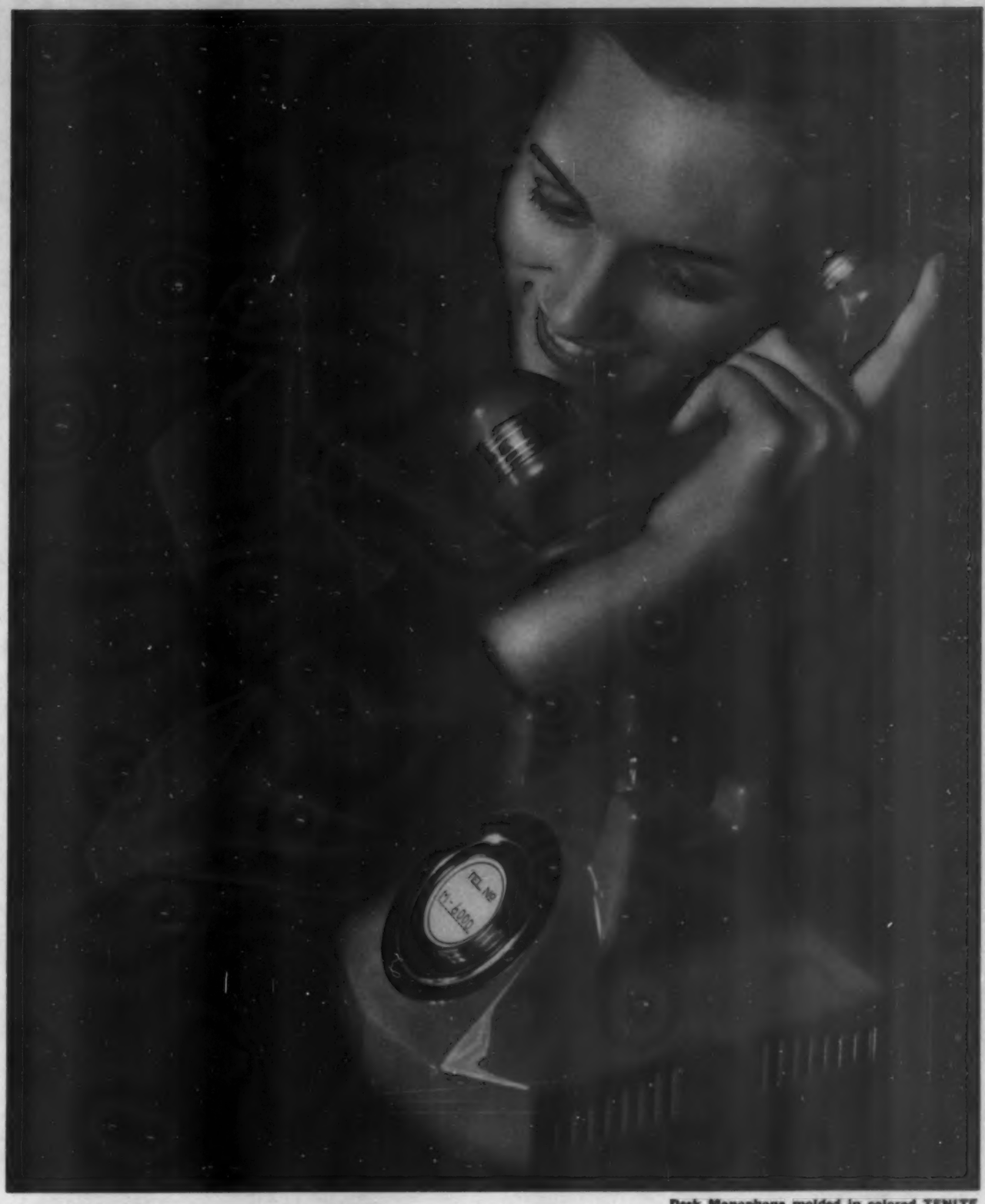
"Do you find the interiors of elevators in modern hotels upholstered like a padded cell? No, I think not.

"Do you find the walls and ceiling of the China Clipper upholstered with fabric? No!

"Do you find pullman cars or speed boats so constructed? No!

"Then why in these days of modern interiors and streamlining, should automobiles be handicapped this way? Why isn't it a perfectly logical step to bring automobile interiors up to the date of their modern exteriors? They can be designed along modern lines that are used in homes. And they will have an appeal to the youth of today. The young couples who are eyeing and buying modern furniture and modern homes. It should be remembered that they are the automobile buyers of tomorrow.

"Present automobile interiors (*Continued on page 52*)



Desk Monophone molded in colored TENITE by Automatic Electric Company

TENITE

imparts lustrous color and exceptionally high strength to the new desk Monophone, which has broken sales records since its introduction. The limitless color range and superior shock resistance of Tenite make it the preferred plastic for many industrial and decorative uses. Write today for a new 52-page book on Tenite.

TENNESSEE EASTMAN CORPORATION *(Subsidiary of Eastman Kodak Co.),* **KINGSPORT, TENN.**

NEW IDEAS

● As a convenient and inexpensive means for compensating distortion or lack of symmetry in grinding wheels, a reinforcing layer of hardenable plastic material is applied to both faces of the wheel under pressure communicated to the plastic layers through plates which are exactly parallel to each other, the wheel being supported only by its contact with these layers. While under pressure, and confined at the edges to insure correctness and symmetry of form, the plastic layers are cured so that they are permanently set in the desired form and the wheel is true in shape. (Frank J. Tone, The Carborundum Co., Niagara Falls, N. Y., U. S. Patent 2,033,263.)

● Artificial lumber having exceptionally desirable properties of strength, durability, fireproofness and adaptability to many constructional uses, and with the added advantage that it provides a potentially profitable outlet for the waste from making redwood lumber, is now made from redwood sawdust, a fluosilicate and a phenolic resin binder. The sawdust is first treated with a hot solution of diammonium phosphate and magnesium fluosilicate (acidified with acetic acid), then screened through a coarse and then a fine screen. The coarse screened particles are mixed with part of the phenolic resin binder, the fine particles with the remainder, and the two mixtures are blended. The resulting composition is molded into lumber shapes as desired. (Francis L. Carson, Pacific Lumber Co., San Francisco, Calif., U. S. Patent 2,033,411.)

● Decorative effects in two or more colors, in patterns or special designs or in lettering, have been obtained in molded articles by a variety of methods, most of which either use coatings or give the design in relief or intaglio. The inlay method, as used with precious metals and expensive hardwoods, has not been considered suitable for plastic materials; but this method has now been successfully adapted to the requirements of artistry in molded plastics. The making of the inlays requires a specific skill which can only be acquired by practice; but once this skill is acquired excellent results are obtained and the finished surface is absolutely smooth (neither relief nor intaglio). The method, once mastered, is not at all difficult, nor is it expensive. Either hot press or injection molding may be employed for making the inlaid articles. Very attractive effects with initials, monograms and the like are produced by this method for novelty articles, containers and other molded products. (B. G., Plastische Massen, March, pp. 100-104.)

● Weatherproof lamp sockets, with the leadin wires molded in place, are made by supporting a sheel blank with one leadin attached thereon upon a threaded apertured plug, inserting the stripped end of the other leadin in the aperture, compressing the insulating molding composition around the blank and leadins so that they are hermetically embedded in the insulation, completing the molding of the socket, and unscrewing the finished socket from the threaded plug. (Joseph R. Neill, Watertown Manufacturing Co., Watertown, Connecticut, U. S. Patent 2,033,643.)

● In molding shapes with large or elongated cross section, e. g. boards or plates, accurate proportioning of the materials is particularly important because essential for obtaining the optimum density in the finished article, and for uniformity. Correct and unvarying proportioning of the plastic material is efficiently and economically provided by a new automatic arrangement in which a tabletting machine is attached to the molding machine so that the tabletted plastic is delivered in exactly the right amount and at the correct time to the mold. The molding machine and the tabletting machine are both actuated by the same mechanism so that they will not lose their synchronism. (Peter Kopp, Berlin-Friedenau, Germany, German Patent 621,819.)

● A novel treatment for increasing the abrasion resistance, and hence the service life of cellulose ester phonograph records is to chill the records at 0°C. (32° F.) for about 10 minutes immediately after the molding operation in which the sound track is formed in the playing surface. The needle causes less wear on the sound track after the chilling than is observed in the untreated records. (Miguel S. Cortes, Barcelona, Spain, Italian Patent 278,729.)

● Arc welding electrodes which copiously evolve a protective gas in the immediate vicinity of the weld and cause thorough penetration of the weld metal are made by powdering the weld metal and applying it to the electrode core by means of a Bakelite binder. The protective gas may be generated, for example, from a hydrocarbon which is added to the composition, which may also include a metal oxide for slag formation. (G. Bock and E. Schröder, French Patent 782,950.)

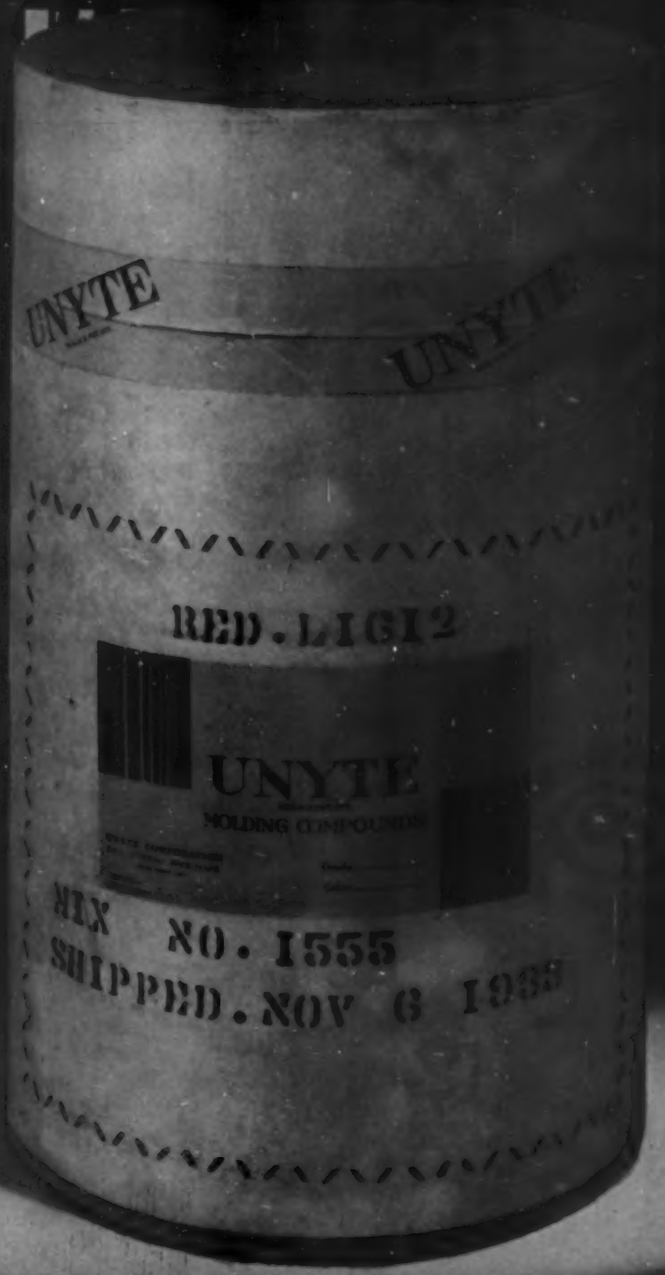
● Molding compositions which have superior properties for making a great variety of shaped articles are made by introducing lactides (derived from organic acids of the type of lactic acid) into cellulose ester compositions in which cellulose triacetate predominates. Other plasticizers, such as ethylacetanilide and triacetin, may also be added; but the lactides impart particularly desirable properties for making molded shapes. (H. A. Auden, H. P. Staudinger and P. Eaglesfield, Distillers Co., Ltd., Edinburgh, Scotland; British Patent 434,970.)

● In line with the above invention, which relies on a small proportion (about 15%) of lactide for the desired result, a different type of plastic which serves chiefly as an excellent substitute for celluloid is made by blending cellulose triacetate with a large proportion (as much as 160% of its weight) of a high-boiling plasticizer such as cyclohexyl acetate or benzyl acetate and a small amount of a swelling agent such as cyclohexanone. (H. A. Auden and H. P. Staudinger, Distillers Co., Ltd., Edinburgh, Scotland; British Patent 435,311.)

● The idea of making molded articles by hot pressing superimposed films is not in itself novel, but is said by a Russian inventor to give particularly successful results when the films are made of a blend of viscose and a phenol-formaldehyde resin. After being dried at 50-60° C. (122-140° F.) the films are superimposed to the desired thickness and molded at 130-140° C. (266-284° F.). (M. V. Sobolevski, U. S. S. R. Patent 43,154.)

● Combs, buttons and like articles made of vinyl resins, phenolic resins or casein plastics can be successfully colored with water dispersions of water-insoluble dyes by soaking 15-30 minutes in the warm dispersion (104-122° F.) containing about 10% of a suitable coal tar dye. In addition to economy, the method offers advantages in the range of dyes which may be selected, and hence in the range of color in the finished articles. (I. G. Farbenindustrie A.-G., Frankfurt am Main, Germany, Italian Patent 319,474.)

STABILITY



SHIPPED NOVEMBER, 1933
MOLDED IN REGULAR PRODUCTION FEBRUARY, 1936
UNYTE IS THE STABLE UREA COMPOUND

UNYTE
REG. U.S. PAT. OFF.
MOLDING COMPOUNDS

UNYTE CORPORATION
521 FIFTH AVENUE, NEW YORK CITY

Backstage

ELIZABETH BULLOCK, whose enlightening story on "Plastics in Hospitals," appears on page 34, was born in Kansas City, Missouri, and has been pretty much on the move ever since. While there she wrote plays of which two were produced at Vassar. She landed in New York about two years ago to free lance and to do theater publicity. Her studies led to several articles on social and economic affairs. She joined the staff of *Tide* magazine for a short time, but left last January to become a free lance writer again. At present she is with the advertising agency of T. J. Maloney, Inc.

FRANKLIN E. BRILL, whose article, "Knife sharpening—new style," appears on page 37, is assistant advertising manager of General Plastics Inc. He started his career originally as a commercial artist, but after a few years was lured into the writing field. Since then Mr. Brill has been with several advertising agencies as copywriter, joining General Plastics in 1931. He contributes articles on plastics and design to a number of business papers and writes several of the monthly Durez house-publications.

PETER MULLER-MUNK, assistant professor of Industrial Design at Carnegie Institute of Technology, who wrote the article entitled "Design at Carnegie Tech" on page 20, was born in Germany, where he graduated from the University of Berlin and the Academy of Fine and Applied Arts. When he came to the U. S. in 1926 he was the proud possessor of a Master's degree in the German Gold and Silversmith Guild. He first worked for Tiffany & Co., and then opened his own studio workshop for industrial design and metal work. Later, feeling that industrial design needed better training and appreciation, he began teaching at various places in New York. In the summer of 1935, he was appointed to his present position. Mr. Muller-Munk has exhibited in a number of the important museums throughout the country including the Metropolitan in New York.

D. A. DEARLE, author of "Color—and its relationship to price" on page 36, came to this country from England in 1914. He attended preparatory school in the Middle West and after a year at the University of Illinois transferred to Massachusetts Institute of Technology to complete his Civil Engineering course. For several years Mr. Dearle practiced engineering with the New Haven Railroad, but at the outset of the depression, left to enter the plastics field as a sales engineer, believing the industry to be one which had vitality enough to weather the long siege. He has been actively engaged in various phases of the business ever since. At present he is sales manager of the Bridgeport, Conn., division of the Consolidated Molded Products Corp. He is well experienced in the subject handled.

Keeping posted

Annual convention

The annual convention of the Toilet Goods Association will take place on Tuesday, Wednesday and Thursday, May 26, 27 and 28 at the Biltmore Hotel, New York City, according to a recent announcement by Charles E. Kelley, of the Entertainment Committee.

New plastic material

A new Durez molding material, No. 77SB black, has been developed by General Plastics Inc., for molded parts in which the unusual combinations of qualities—acid resistance, frictional wear resistance and low water absorption—are required. This new material has a weight of only 20.6 gms. per cubic inch, or a specific gravity of 1.26, and a water absorption rate of 0.2% A.S.T.M. In addition, it resists all the common concentrations of acids. An unusual feature of the material is that it can be machined, sanded and buffed after molding, without exposing spots of filler or impairing the acid- or friction-resistant qualities.

Museum of Science and Industry

The New York Museum of Science and Industry opened in its new home at 30 Rockefeller Plaza during the past month. It has, in addition to its portrayal of scientific and industrial developments, invited as special features, four notable research laboratories to give some of the demonstrations they made to industrial and banking executives on the recent Laboratories Tour conducted by the National Research Council.

It is founded for the purpose of imparting to those who are not scientists and engineers an insight at once into the power as well as the limitations of technology when applied to the peaceful arts. Through its exhibits it attempts "(1) To show clearly to the non-scientific person the fundamental principle which runs through every stage of development of a science application from its first primitive appearance to its latest refined embodiment; (2) To emphasize the fact that even this latest embodiment is but a transitory stage in a continuously expanding evolution; (3) So far as is now possible, to bring home to the non-scientific a realization that every department of science is devoted to the portrayal of a common Nature."

CATALIN *fabricators*

CATALIN can be cut as readily as brass or wood

CATALIN for parts of irregular contour are shaped on a standard turning lathe

IVORYCRAFT COMPANY
40-17 22nd Street, L. I. C., N. Y.

Fabricating CATALIN exclusively to the trade. We are especially equipped to handle volume production of cutlery and utensil handles of all types.

Your inquiries will receive prompt and immediate attention.

•

H. KREUL COMPANY
5222 Crane Ave., Detroit, Mich.

Specialists in fabricated CATALIN products for the automobile trade, radiator ornaments, knobs, handles, fittings of all types. Equipped to do quality and quantity production work.

•

KREST MANUFACTURING CO.
329 E. 29th St., New York, N. Y.

Specialists in beer and soda fountain dispenser balls and fittings, also gear shift knobs, hardware items, razor handles, radio parts and similar products in large quantities.

•

HURST, INC.
791 Tremont Street, Boston, Mass.

Your requirements for commercially accurate CATALIN products or parts can successfully be entrusted to us.

New and modern equipment enables us to supply fabricated pieces to exacting specifications. We manufacture for such firms as International Silver Company, Scovill Manufacturing Company, Continental Silver Company and many others.

CATALIN knobs, balls or other ornamental trimmings in beautiful colors will improve your products and build up additional consumer appeal.

Our industrial designers and our modern facilities are at your disposal.

May we serve you?

CATALIN is furnished by us only as raw material in the form of rods, sheets, tubes and special castings. We do not manufacture finished products and for your convenience, offer herewith a partial list of authorized CATALIN fabricators.

Should you desire any special information on manufacturing problems, our Engineering Department will be glad to cooperate with you and, if required, recommend fabricators in your locality who are suitably equipped to do your work.

For your convenience, we maintain at our New York office a stock room and fully equipped sample department.

INDUSTRIAL PLASTICS COMPANY
643 W. 43rd St., New York, N. Y.

We make a specialty of packaging items for cosmetic products such as powder and rouge boxes, compacts, decorative bottle tops as well as containers suitable for displaying such products as jewelry, hosiery, stationery and similar items.

Industrial applications where accurate dimensions and close supervision are important receive our careful attention.

•

QUALITY TURNING COMPANY
96 Exchange St., Leominster, Mass.

Fabricators of CATALIN items such as brush handles, knobs and trim for silver and metalware as well as furniture hardware.

We have a modern plant and can handle your orders promptly and efficiently. Your inquiries are invited.

•

K. C. CUSTOM PLASTIC FABRICATORS
211 East 14th St., Kansas City, Mo.

Our well-rounded equipment enables us to accept contracts for CATALIN parts of all types. We are in a position to fabricate CATALIN in any quantity and in accordance with specifications.

Let us help to solve your manufacturing problems.

•

DOUGLAS TURNER
3025 Watson Boul., St. Louis, Mo.

For fabricated parts of CATALIN of all types and description, come to "Turner." Our equipment is of such diversified nature as to enable us to take prompt care of your inquiries.

Your inquiries are solicited.

AMERICAN CATALIN CORPORATION

ONE PARK AVENUE, NEW YORK

The Museum is open to view from 10 A. M. to 10 P. M. weekdays, and from 10 A. M. to 6 P. M. Sundays. There are a number of splendid applications of plastics in evidence including a demonstration of polarized light and its contribution to three-dimensional photography for motion pictures.

Design exhibit at Los Angeles

An exhibition of the work of professional designers called "The Process of Industrial Design" is being assembled in Los Angeles in connection with the Art Center School in that city, under the supervision of E. A. Adams, director. The show will consist of designs or phases of design leading to the improved, final result, which in each case will be a manufactured product. It is planned for its educational value, and according to tentative arrangements, the complete exhibit will travel throughout the country in response to the enthusiasm manifested by the public in all phases of industrial design. The exhibit will be opened on May 1.

"Premium Clinic" at exposition

In recognition of the growing importance and interest in premium advertising by all classes of industry, there will be a "Premium Clinic" established at the National Premium Exposition held at the Palmer House, Chicago, from May 4th to 8th inclusive. Anybody is welcome to consult at the clinic with an individual competent to give advice from long experience in premium advertising practice. On Tuesday, May 4th, a Round Table discussion is planned for all those interested in this form of advertising, following addresses by several authorities in the field.

Streamlined drafting machine

L. G. Wright, Inc., has published a pamphlet giving complete details of their newly designed, streamlined "Wrigraph" drafting machine which is mounted on a 20" x 30" cleated, white pine board. The parallel mechanism is hand-assembled with all steel nickel-plated parts and solid phosphor bronze bearings. This model is equipped with a vernier indicating protractor reading to degrees. The protractor unit has a unique chuck plate to hold the drawing attachments in alignment. The graduate L-square blade is made of pyroxylin and riveted to a lightweight aluminum stiffener which has a satin finish to eliminate glare. If you have your own board, the machine may be obtained with a special base plate to easily fasten to any flat wood surface without screws or clamps. It only takes a minute to attach and should be a valuable help to draftsmen.

ABC

Cellulose Acetate
Cresylic Acid
Sodium Acetate
Acetic Anhydride
Casein

Dibutyl Phthalate
Diethyl Phthalate
Dimethyl Phthalate
Triphenyl Phosphate
Triacetin

AMERICAN-BRITISH CHEMICAL SUPPLIES, Inc.
180 MADISON AVE., NEW YORK, N.Y.

Associated Company
CHAS. TENNANT & CO. (CANADA) LTD.
372 Bay Street, Toronto 2, Canada

Agriculture and industry

The Farm Chemurgic Council will hold its annual meeting at the Dearborn Inn, Dearborn, Michigan, on May 12, 13, and 14. Agriculture, industry and science will be thoroughly discussed with regard to their relationship with one another by various speakers of national prominence. Visitors will have ample opportunity to witness the soy bean development being carried on at the Edison Institute of the Ford Motor Co., which is located within a few minutes' walk of the Inn. Arrangements can also be made to visit the new plastics plant at River Rouge where gear shift knobs, window reveals and other parts of Ford cars are being molded of soy bean plastics. Reservations in Detroit should be made in advance, because accommodations at Dearborn Inn will be limited to those in the program.

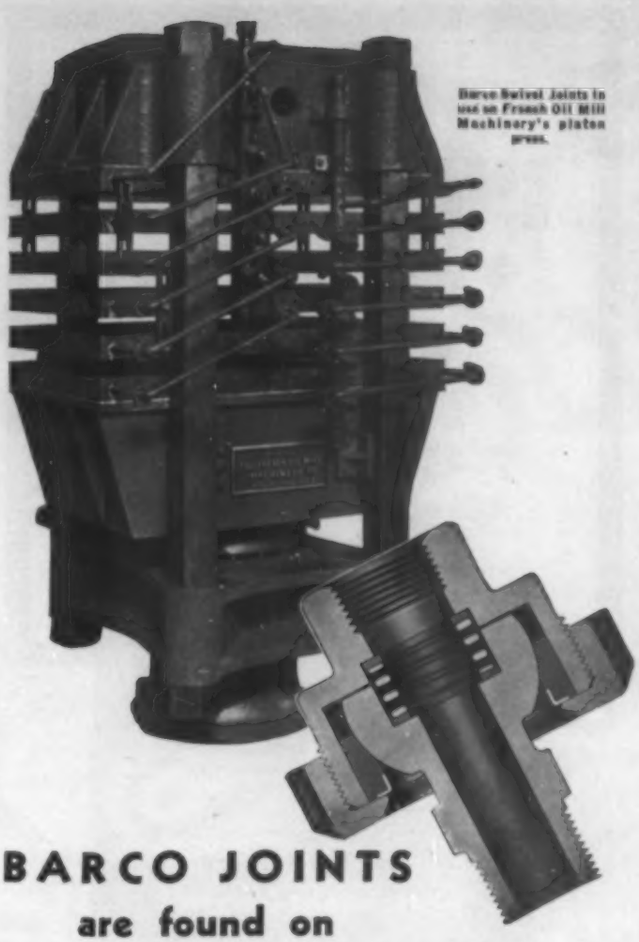
Profiling engraving machine

A diesinking-profiling-engraving machine for both three dimensional and two dimensional or flat work is the latest development of the Marquette Mechanical Engineering Co., Inc. This machine is an automatic, as well as a semi-automatic and manually controlled pantograph unit, with gyrostatic electronic tracer system which will copy or reduce to any size desired within a ratio of 1-1 to 6-1. It is a sensitive device capable of delicate work and suited to deep,

heavy cutting in three dimensional direction for molds, Plastic dies, die casting molds and drop-forging dies. The work table on the machine takes jobs up to 28 in. in length, and 12 in. in width, and is provided with three $\frac{5}{8}$ in. T-slots. The machine illustrated is one in use by The American Emblem Co. in Utica, manufacturers of escutcheons and radios.

Open forum on plastics

The New York District Committee of the American Society for Testing Materials will hold an open meeting on Tuesday, April 21, at 8:00 P. M. in the North Ballroom of the Hotel New Yorker, New York City. Mr. Carlton Ellis, who is a scientific investigator, inventor, and author in the fields of petroleum and synthetic resins, will give a lantern slide talk on synthetic resins. Mr. Ellis will furnish an exhibit and



Barco Swivel Joints in use on French Oil Mill Machinery's platen press.

BARCO JOINTS
are found on
GOOD EQUIPMENT

On many types of equipment utilizing pipe lines, Barco Swivel Joints have been specified to provide low cost operating protection.

As standard equipment on presses, vulcanizers, pumps, molds, etc. Barco Joints provide unfailing leakproof action. They eliminate those troubles which cause loss of production time and increase maintenance expense. They are fluid-tight under suction or pressure—leakproof under wide alternating temperature variations.

Specify Barco Joints on your equipment.

Barco Swivel Joints are standard equipment on this Baldwin-Southwark steam platen press.

Barco Joints on a R. D. Wood Company steam platen press.

BARCO MANUFACTURING COMPANY
1813 Winnemac Ave., Chicago, Illinois
Complete details of Barco Swivel Joints are contained in Catalog 255. Write for your copy.

BARCO
FLEXIBLE
JOINTS

Phenoform

Colors

A wide range of colors for plastic compounds — especially selected and prepared to meet the most exacting requirements in molding. For particulars apply to

General Dyestuff Corporation

230 Fifth Avenue, New York, N. Y.

there will be a general discussion following this talk. The meeting is open to anyone interested in petroleum or plastics. Mr. Ellis is the author of "The Chemistry of Synthetic Resins" published recently in two volumes by Reinhold Publishing Co.

New office

Designers for Industry, Inc., announce a new office at 304 Wrigley Building, Chicago. Telephone, Superior 6303. Mr. Charles W. Jack, assistant to the president, is in charge. The company specializes in industrial design, product development and sales presentation.

Books of the month

Injection molding

A 52-page book has just been published by Tennessee Eastman Corporation which is one of the most complete treatises on cellulose acetates that we have seen. In addition to its interesting format and splendid printing, the book goes completely into the details of Tenite in its diversified applications. There are twenty full-page illustrations showing a variety of products, together with a number of drawings which illustrate the conventional and injection methods of molding acetate materials. Details are carefully explained so that designers and engineers can learn much to their advantage through its reading. The cover, which is itself laminated between two transparent sheets of Kodapak, is indeed striking. If you would like to have a copy, just tell us.

Combination pyrometer

The Pyrometer Instrument Co., has issued a folder showing a new set of combination surface and needle pyrometers. This 4-in-1 instrument will find wide application in industries such as die casting, plastic molding, rubber processing, paper, textile, electrical, metallurgical, glass, and pottery.

By interchanging the various types of thermocouples, the instrument is transformed into four different types of surface and needle pyrometer. The new indicator is equipped with Pyro patented clamping device which eliminates the necessity of making contact and reading actual temperatures simultaneously, as the indicating needle will stay fixed at the correct temperature indication.

Thermo Control booklets

Thermo Control Devices, Inc. have recently brought out three booklets illustrating the Control Pyrometer, Flame-Otrol—an automatic gas shut-off, and the small, indicating Pyrometer, all of which this company manufacture. The leaflets completely explain the principles of operation, uses, prices, and for the Flame-Otrol, the method of installation.

Molded packaging

Molded Durez for packaging is the subject of a new booklet issued by General Plastics, Inc. Twenty-one ways in which Durez can be used to package a wide

What we have done for others we can do for you!

An Example
of Good
PLASTIC MOLDING

At first glance this sample of STOKES PLASTICS may seem comparatively simple—but look at the various planes and angles involved. Notice the number of metal inserts moulded firmly in place. This is precision moulding that *counts*. If your problem seems intricate, write us. Our experience may help you in its solution.

Jos. Stokes RUBBER CO.
Trenton, N. J.

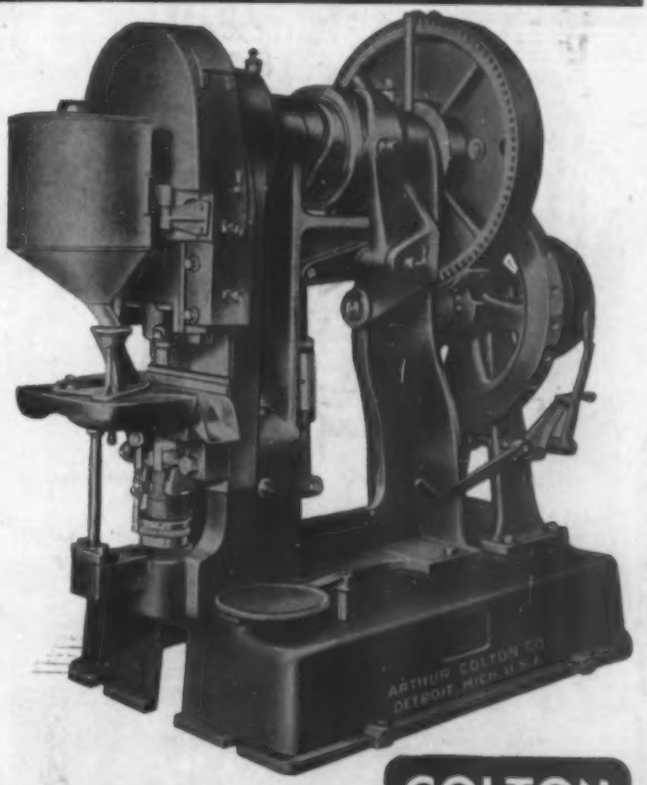
MOLDERS SINCE 1897

Canadian Plant—Welland, Ontario

COLTON Preforming Machines have won wide usage because of their inherent sturdiness, their uniform, speedy and satisfactory performance.

Note the new, improved 5½ Tablet Machine shown at right. The solid steel frame insures perfect operation; the improved die fasteners, improved cam construction, heavier ejecting arm brackets and vanadium steel plunger make possible high speeds without fear of breakdown or lowered quality. In every particular, we believe, this machine is by far the finest the market has to offer.

The 5½ Tablet Machine makes tablets up to 3" in diameter and having a fill depth of 2⅛". Other Colton Preforming Machines—single punch, multiple and rotary—are likewise outstanding in construction and performance. Write for literature on these machines or have our engineers visit your plant—



ARTHUR COLTON CO.
DETROIT, MICHIGAN

COLTON
DETROIT

ARE YOUR MOLDING REQUIREMENTS SEASONAL?

If your product sells best at only one season, you'll often be at a disadvantage when seeking molding prices and service. For most molders figure on the basis of press use over the year.

We do, too. But lucky for you, we have been able to match "seasons" on our many accounts so that presses remain in practically continuous production. So our service and prices never suffer. Ask us for proof!

AMERICAN INSULATOR CORP.
NEW FREEDOM, PENNA.

SELF CONTAINED
Pump tank motor and press one compact unit.

TROUBLE PROOF
No oil pressures over 650 lbs. per sq. in.

ADJUSTABLE SPEED
Obtained by one simple adjustment.

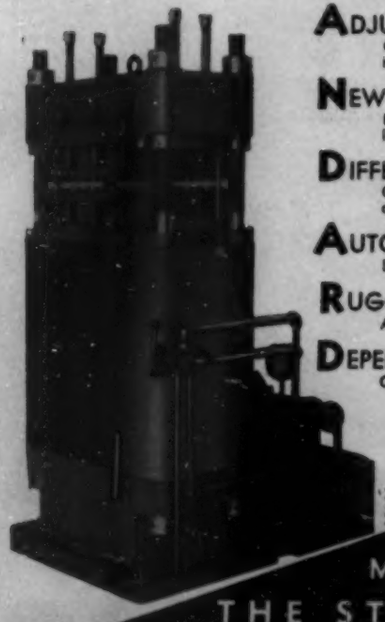
NEW
100-ton platen pressure with 650 lbs. per sq. in. oil pressure.

DIFFERENT
Combination of toggle and hydraulic principle.

AUTOMATIC CHANGE
Low to high pressure.

RUGGED CONSTRUCTION
All parts of generous design.

DEPENDABLE
Continuous production assured.



MFGD. BY
THE STANDARD
MACHINERY COMPANY
MYSTIC CONNECTICUT

variety of products ranging from cake to cosmetics are illustrated and described in this convenient accordion-folded booklet, making a very complete panorama of plastic applications in the packaging field. Detailed descriptions of molded Durez boxes, jars, displays, closures, and other products are included in the publication. Sent free by addressing your request to the Books of the Month editor.

Merchandising booklet

Attractive photographs with descriptions of a number of Beetleware articles suitable for all types of premium and promotional use comprise the colorfully bound booklet recently distributed by this division of the American Cyanamid Co. The comprehensive foreword gives a complete description of the material and its possibilities for use from stockmolds, for special articles and industrial applications. A copy will be gladly sent upon request.

New plastic sheet

The Detroit Paper Products Corp. announces a new plastic sheet material suited to the refrigeration, automotive and building industries. It is called Duraloy, and is finished in high gloss, satin or eggshell which is the result of enormous pressure reported to be not duplicatable by any other process. It is resistant to heat, chemicals (except strong alkalies) and oxidizing acids so that washing solutions, fruit acids, battery acids, fats, oils and waxes have no effect upon it. It is reported to be completely free from odor which makes its use possible in connection with foods. It is claimed also to have the advantage of lower cost than other materials of its type.

Duraloy can be used as a structural unit because its high tensile and flexural strength assures ample rigidity. It can be fabricated at the plant to fit directly on the job or can be supplied in sheets, sawed, drilled and fitted on the job. A pictorial booklet showing several of the many uses of this versatile material has just been published and will be sent for the asking. Just write to the Books of the Month editor.

Synthetic rubber molding

(*Continued from page 19*) short, the plastics industry can welcome a lusty, new member.

Below we have listed the physical characteristics of each of the four black powders being supplied at the present time. (Color is still a bit around the corner.) It undoubtedly will be necessary to bring out additional molding powders to meet specific requirements.

Thiokol Molding Powder	Shore Duometer Hardness	Specific Gravity	Volume Ratio
#455	55	1.478	4.90
#472	72	1.545	3.30
#476	76	1.580	3.15
#484	84	1.598	2.75

Knife sharpening—

(*Continued from page 37*) and their choice of materials has interesting angles. First of all, the set had to be sanitary, and also attractive. Grooves and joints were *out*. Then, too, it had to be light in weight, because it was moved around a lot. It had to be oil-proof and chemically inert. The shape was dictated by function, and the ideal material had to take that shape easily and without excessive assembly operations at the factory.

Cast metal, stamped metal and phenolic plastics—these were the materials most seriously considered. Carborundum officials made three models, one in each material, and took them out to the purchasing agent of a large food chain, and sought his opinion. The cast metal was ruled out first because of excessive weight and the cost of machining and finishing. The stamping went next, because the whacking the device gets would chip the finish and expose rustable, germ-harboring pits. Also, the shape of the base precluded a one-piece stamping, and joining the well to the base would leave a dirt-catching crack, when a fillet was obviously called for. That left plastics, and its smoothness, its lightness, the inherent antiseptic action of the material, and ability to take a smooth jointless shape and resist chipping, won the chain's approval.

The Carborundum trademark, seal and other lettering are engraved on the cover in relief. Rubber feet are attached to the base. Knobs are also black phenolic with notched edges for easy grip.

The answer to page 10

Modern Plastics
425 Fourth Avenue
New York City

Gentlemen:

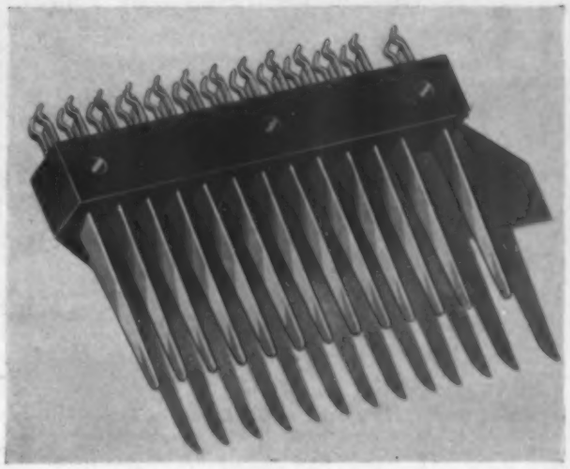
I want to get MODERN PLASTICS regularly. I don't want to miss any of its up-to-the-minute information on new products, new processes and new designs in every field of plastic manufacture.

Please enter my subscription with the understanding that I may call upon you at any time for information as to methods, source of supply, etc.

Very truly yours,

(Ade)

NOT A COMB



but this Consolidated molded plastic creation does split hairs in its precision

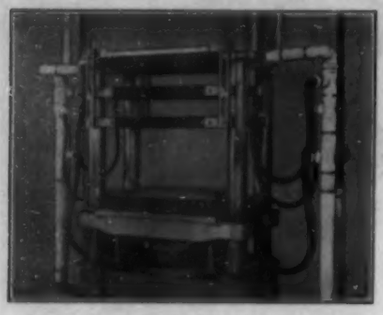
There are thirteen thin phospor-bronze prongs molded into the small plastic insulating block of this intricate part, designed for a modern business machine. Accuracy in spacing is imperative. High dielectric and tensil strength is essential. Every detail of the specifications is incorporated, with the precision and uniformity that are characteristic of plastic parts produced by Consolidated Molded Products Corporation.

CONSOLIDATED
MOLDED PRODUCTS CORPORATION
SCRANTON, PA.

Sales Offices: New York : : Chicago : : Detroit : : Cleveland

FORMERLY MOLDED PRODUCTS DIVISION OF AMERICAN RECORD CORPORATION

All Steam-Water Joints Solid



P.M.P.

Seamless Flexible Hose Connections

Patents granted and pending

STOP Those steam leaks which cost you Extra Dollars for Extra Fuel. Stop your loss of production caused by time out for repairs and maintenance.

LOOK At the picture of P.M.P. Flexible Seamless Metal Hose on a large Platen Press. This is an actual photograph of an installation made over 2 years ago that is still going strong. This hose is handling alternately steam at 150 lb. pressure and cold water.

LISTEN Fittings are Solderless, Brazeless and Packless. Self-Applied Union-Effect fitting for sizes up to ½" Flared End with standard union on larger sizes.

Self applied union fittings can be used over and over again, with P.M.P. Hose which is furnished in coils of 25' to 50'. Fittings are easily and quickly attached by your own men. Let us quote prices to your specifications.

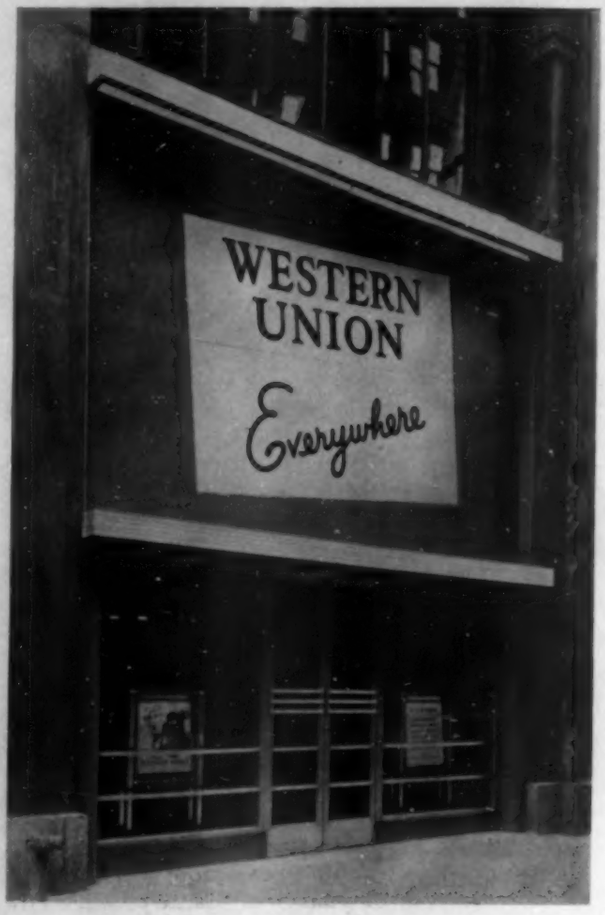
PACKLESS METAL PRODUCTS CORP.
35-30 Forty-second St. Long Island City, N. Y.

Phthalic Anhydride Flakes

CHEMICALS OF QUALITY
Monsanto
ST. LOUIS, U.S.A.

Symbols of industry

(*Continued from page 17*) one views the "works." The counter opening is brilliantly lighted by lens lights to provide intense illumination where needed. The conception of the whole lighting scheme though completely utilitarian, has produced a dramatic effect. Bright light is where you need it—at counter, at desk and in the working space; elsewhere it is diffused.



Exterior of the new office featuring a huge reproduction of the conventional Western Union blank in yellow painted on aluminum

The use of color, itself an innovation in a Western Union office, accents the contrasts in plan and lighting. The walls of the lobby are a soft medium blue with furniture to match. The yellow blanks and yellow and aluminum clock stand out in bright decorative relief. The work space, where light reflection and color are needed, is a pale clear yellow. The doors, trim, wainscoting and furniture in this space are blue to match that used in the lobby.

One of the most distinctive features of the office is the special circular blue desk, located in the center of the customers' space. It is built around a column 6 feet 3 inches high and acts as the lighting source for the entire office. Eight aluminum running messengers parade around the top between decorative aluminum bands. Accommodating four customers, complete privacy in the composition of telegrams is assured by low partitions of metal and glass. These partitions, made of glass further to reduce the effect of height,

serve as racks for holding telegraph blanks. The writing surface of the desk is blue linoleum. Immediately above the desk surface on the column are a series of louvres, behind which lights are placed to give individual illumination at each of the four desk divisions.

It is interesting to observe that, modern as this office design appears to be, the space above the glass on the outside of the building is *painted aluminum* electrically lighted by cumbersome fixtures attached above and below. How nicely this could have been simplified by using a laminated plastic for this surface with a translucent center panel for the design which could have been illuminated by concealed lights at the back.

Design at Carnegie Tech

(*Continued from page 21*) As a further attempt to bring order out of chaos, industrial products were divided into separate material groups—wood, clay, glass, metal, etc., and properties and goods derived from them were investigated.

It was obvious and inevitable that plastics should be part of this scheme. Here was a truly "modern" new family of chemicals, whose adaptabilities to various production methods and products cut clear across the territory of many of their older rivals. However, no organized, deliberate effort seemed to have been made by this $300,000,000 industry to adopt the designer as the executive necessary for its further growth and development. Instead of the usual competition common to most other materials catering to more or less specific markets and consumer groups, a preponderantly chemical warfare was presented by the plastic industry. Technical qualifications resulting from different chemical formulas had established certain major product groups. The product itself, however, whether of molded or cast phenolics, casein or laminated synthetics, displayed little distinguishing design characteristics. We therefore, had to undertake to gather ourselves data essential for our work. First—a listing of exact physical properties of the various plastics. Second—a division into more definite usage groups. Further a compilation of plastic products now on the market. Finally a list of products capable of manufacture in plastic materials. The results were astounding and seemed to open so promising a market for the plastic industry and the designer that further research is at this writing under way.

One of the most crying needs for our particular work was, of course, a hand book for the designer of mass products of this material. It was evident that given a new material, certain new and definite laws for the designer would follow from its properties and manufacture. Beyond the more or less general laws imposed upon design by dies and molds, what specific characteristics inherent, let us say, in cast resins influenced the design of their products? How could the designer reduce production costs and increase eye appeal? With an astounding variety of stock shapes common to this industry, we began to analyze possible multiple uses for each of them. With the generous assistance of those in the plastic industry, the first full size model of student designs have been carried out in our workshops, and are represented in the photographs used to illustrate this article. A collection of stock

FOR
HIGH PRODUCTION
THERMOPLASTIC MOLDING

Southwark is constantly studying the equipment requirements of thermoplastic molding for the purpose of offering methods and machines for cutting manufacturing costs, for increasing production rates and profits.

As an example, 1,500 molded tube bases per press hour is the production rate in a large lamp works. As one workman is capable of operating two such presses at a time, the rate permitted with this type of equipment is 3,000 tube basis per man hour.

Nearly a century of accumulated experience stands behind Southwark's engineering and production of such equipment. Today, countless products of widely varied character are made more profitably on Southwark machines.

Have you considered how Southwark might help you? Whatever your manufacturing problems, be they large or small, standard or special, consult Southwark. An interview will not obligate you in any way.

BALDWIN-SOUTHWARK CORP.
Southwark Division Philadelphia
Pacific Coast Representatives:
The Pelton Water Wheel Co., San Francisco

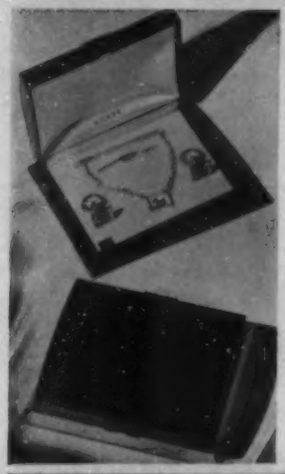
SOUTHWARK

CONSULTANTS ON MOLDING EQUIPMENT
BURROUGHS ENGINEERING CO.
NEWARK, NEW JERSEY

EXPERIENCED USERS OF

PLASTICS KNOW THE VALUE

OF DIEMOLDING'S EXPERIENCE



The Hickok Company, one of the first firms to use molded packages and also one of the most successful, has chosen the Diemolding Corporation to do its work.

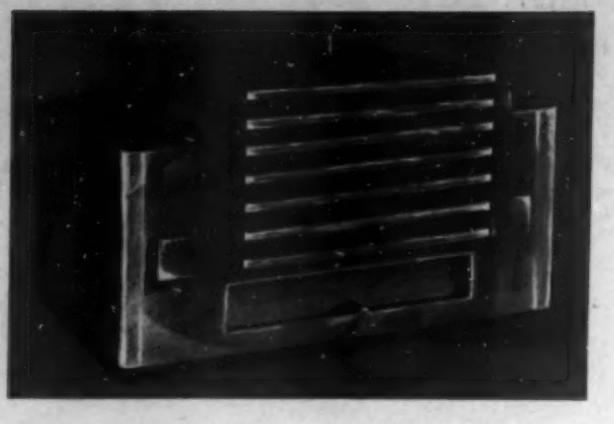
Yet the fine moldings we have produced for Hickok are but typical of the entire output of our plant . . . a plant manned by engineers skilled not only in molding technique but in the relating of their work to your particular needs. Call upon these men as you would upon your own plant executives.

TRADE DM MARK DIEMOLDING Corporation
CANASTOTA NEW YORK

Complete line of
Machinery For Celluloid
And Plastics Mfrs.
JOHN J. CAVAGNARO
HARRISON Engineers and Machinists ESTABLISHED 1881 NEW JERSEY
Special Representative
Evarts G. Loomis
126 So. 14th St. Newark, N. J.

Presses for Dehydrating, Filtering, Caking, Polishing, Stuffing, etc.

Cavagnaro-Loomis Vacuum Mixer
(Patented)



6. Radio cabinet along modern lines designed by Katherine Wiegel especially for molding in phenolics or ureas

materials and colors is likewise being formed. Much, however, still remains to be accomplished. We believe that the plastic industry as a whole has much to gain from the success of our undertaking, just as we need their support to expand and complete our studies. It seems almost daring at times to promote plastics in a city where "steel is king" but I hope those whose cause we are defending will not forsake us.

Detroit meeting

(Continued from page 38) are always dusty and soiled. The upholstered walls and ceiling retain the dust. They are difficult to keep clean. And when anything goes wrong with window controls—and things do sometimes go wrong—upholstery has to be removed and is never the same again.

"Why not, then, consider the advantages of laminated plastics for the automobile of the future! Interiors would be sleek and clean. Of course, it will mean some interior structural redesign, but it will be worth the effort. It will mean eventual savings on the production line. I believe it is a more logical advancement than some of the developments now under way. For example, I am referring to the molded-laminated method of fabrication rather than conventional molding.

"By this method, the interior panel of a door including window reveal or garnish trim would be all in one piece. It would be produced much the same as metal stamping is now accomplished except of course that heat would be required. This complete panel could be screwed in place on the "line" by one man—and with one operation. Would that save any labor and time to offset the differential in costs of this new material if there were any additional costs? From observation, I would say it would.

"The whole interior of a coupé, for example, would consist of two door panels—four side panels and one top panel which would completely cover the space between the windshield and the back of the seat. These panels could be shaped to fit in the molder's shop and merely snapped into place in a properly designed molding or they could be attached with screws with minimum effort.

"They could be kept clean with soap and water.

They wouldn't be cold to the touch. They would never scratch—and the finish would last as long as the car. A little polish would restore the original luster when it came time to 'trade.'

"Laminated material is rugged and inert and its cost should be within reason once volume production is reached. Such design would not preclude the use of light colors. They may not be ready yet, but let some automobile manufacturer bring out a car with a light gray or ivory laminated interior inlaid with a contrasting color and see how long it will be before material men begin to supply the demands in any color. The range of decorative designs will be illimitable and a great deal more individual charm will be available in each car.

"Then, and then only, will interiors be in complete harmony with the splendid advance made in exterior design in the past few years."

For more than an hour after the meeting, engineers and students examined the samples and asked questions galore.

Color—and price

(*Continued from page 36*) matter can not be detected in a black or brown material, but it is glaringly in evidence in any of the lighter shades. Secondly, blisters are more prominent in an ivory piece than they are in the darker colors, and this is probably due to the fact that a blister gives the appearance of having a different shade, while in black it does not have such an effect. Finally, the necessity of changing the heating media brings with it a subsequent amount of "first run" samples which are not suitable to pass either first or final inspection. All the above factors contribute largely to bringing the rejections higher than in the regular run of phenol powder, and it can be safely asserted that an additional 5 per cent. must be allowed to offset these extra defective pieces. So far as packing and shipping are concerned, color makes little or no difference in the cost. The slight dissimilarity in specific gravity is almost negligible and has no bearing on the comparative shipping weights.

To recapitulate them, we find that in general the material price of urea powder is approximately three times higher and the labor cost almost 20 per cent. above that of ordinary black or brown. From this knowledge we can deduce a formula that any buyer can apply to his product if he wishes to determine roughly what a change from black to the pastel shades will cost him. Of course, it will be necessary to use certain assumptions inasmuch as every molder has a fixed method of figuring his costs. If, however, we assume a phenol powder to cost 11 cents a pound and a urea material to be bought at 33 cents a pound, and the flash to be 20 per cent. on the net weight of the piece, and an additional 20 per cent. on pressing and finishing labor, then we have left to assume only the overhead, and the sales and administrative figure that is used by the molder of the item. If overhead, or burden, for example, be taken as 150 per cent and sales, administrative, etc., be called 25 per cent., a formula can be applied by the customer to any item and assumed to be somewhat close to the price he should have to pay for his product in a pastel shade

FOR BETTER MOULDED PARTS

A New Plant,
New Equipment, and
a Renewed Desire to Serve

To those who may not have seen our announcement in the February issue of this magazine, we again publish the information that we are now located at our new plant at 1200 Southard St., Trenton, N. J., where all production, including planning, engineering, mould-making, and moulding are ALL DONE AT THE SAME PLANT.

Kuhn & Jacob
MOULDING and TOOL CO.
1200 Southard St., Trenton, N. J.
New York Office, Buckminster 2-6325 Phila. Office, HAncock 0972

A NEW
MOLDING POWDER
HI-TENSITE
NON CARBONIZING
FREE FLOWING;
developed for use in intricate forms
with inserts

TECH-ART PLASTICS
21-21 41ST AVENUE LONG ISLAND CITY

"Standard"
POWER
JIG SAWING
MACHINE
BALL BEARING

Faster and better jig sawing with the new "STANDARD" machine.

—Ball bearing countershaft.
—Longer stroke.
—Quicker starting and stopping.
—Heavier arm and ball bearings eliminate vibration.
—New oiling system.
—Can be furnished with motor drive.

WE ALSO FURNISH
SAW BLADES
JIG SAW WIRE
JIG SAW VISES

We specialize in MACHINES, TOOLS, DIES and MOLDS for working CELLULOID, CATALIN and similar plastic materials.

Dies for Injection Molding

No. 1 machine has 9" swing between saw and arm.

No. 2 has 16" swing.

STANDARD TOOL COMPANY
73-75 WATER ST. LEOMINSTER, MASS.

EXCLUSIVE PLASTIC JEWELRY FINDINGS

Stock items suitable for setting in brooches, rings and ear-rings, dress and shoe buttons, pendants, bracelets, picture frames, cigarette cases and boxes, compacts or any colored ornamentation.

Special designs and shapes made to your order. Write us for information about our new mould finance policy on custom mouldings.

We do not manufacture finished jewelry, but jewelry findings only.

SYNTHETIC MOULDED PRODUCTS, Inc.
STONINGTON, CONNECTICUT

as compared to the price in black or dark colors.

He should first weigh the piece, convert the unit weight to the number of pounds per thousand, write down the molder's selling price and use the figures in the following equation:

$$P=1.5B+.26N$$

Where P is the cost in pastel, B the cost in black and N the net weight in lbs. per thousand pieces.

Realizing that the majority of buyers may not be interested in lengthy algebraic formulas the above has been derived and reduced to the simplest possible form. All that is necessary in its application is taking the cost of the item in dollars per thousand and multiplying it by one and one-half, and then adding to that figure approximately one-quarter of the net weight (which is taken in pounds per M). The price should be taken in dollars, and the net weight considered in dollars also. For example, if a certain phenolic article is being purchased at $24.00 per thousand and the net weight of the piece is 56 pounds to the thousand, then the approximate cost in ivory should be one and one-half times twenty-four plus one-quarter of 56 which amounts to

$$36+14=50.00$$

From the above it can readily be seen that pieces having heavy weight, as compared to the labor involved, cost proportionately more, and conversely, lighter pieces may not involve much of an additional figure. It can also be seen that if the weight of the item is double the price per thousand paid for it, then the cost in urea will be approximately twice that currently paid, and where the weight exceeds double the price, the cost will be over 100 per cent. more. Hence it would be a great deal more expensive to change the color in the molding of a radio cabinet than it would be a bottle cap, a button or some other small item.

As previously stated, the application of any such formula, while comparatively simple, can be considered only as an approximation. It is utterly impossible to derive an exact figure or ascertain a constant which could be used for all cases, due to the apparent variables, but there are a few salient factors that are brought to light by the investigation which should be helpful to the progressive designing engineer who is considering the advisability of modernizing his product or offering a variety of shades.

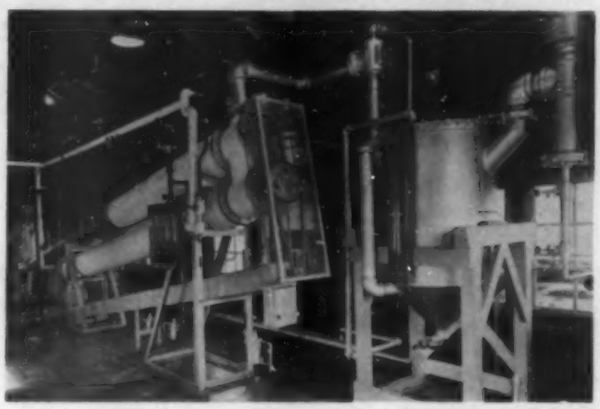
Industry and the soy bean

(*Continued from page 15*) to 12,000. About 300 varieties have been tried on this experimental farm. The quantity of beans raised has been sufficient for only a small percentage of its requirements. It has, however, supplied the needs of experimental processing up to the present time.

The general plan is to produce a simple processing unit which will satisfactorily separate the oil from the beans. This unit to be available at low cost to farmers in rural communities who can raise beans in the summer and process them in the winter. A six-ton experimental unit has been in operation at Greenfield Village for more than a year. It will process 1200 tons or 40,000 bushels of beans in about 200 days, or the production of about 2000 acres at a processing cost of about 15 cents a bushel. A unit of this approximate

size will lend itself to farm community operation and represents an investment of between $1500 and $2000.

The unit is extremely simple in operation. Beans are dusted or winnowed and fed into the top hopper where they are ground or crushed into flakes similar to corn flakes. These flakes drop to the bottom of a long tube and are carried countercurrent through a solvent of Hexane, which is similar to aviation gasoline, and into a jacketed portion where the solvent is drained off. In the middle and lower tube, the flakes are freed from solvent and dried. The solvent is fed



Experimental unit at Edison Institute where soy beans give up their oil and meal to the subsequent benefit of both agriculture and industry. In these long tubes the oil is extracted from the beans and runs with continuous flow into a barrel at the right (not in the picture). The oil is then freed from the solvent in the "still" in the foreground from which the solvent is drawn to be used again

into a long tube, or percolator, near the upper end. The oil and solvent flow off through a filter and into a still, where the oil is freed from the solvent. The solvent from both sources is now collected and recovered in the decanter from which it is taken and used again. The extracted soy bean oil flows into a container at one end of the unit, while the flakes are ground into meal and emerge in finished form at the other end all ready to pack in bags.

The oil, which is of good quality and uniform color, is used in enamel for painting cars; while the meal, which contains almost 50 per cent. protein, making it somewhat similar to animal horn and milk casein, is reacted with phenol and formaldehyde into a molding compound. Contrary to popular opinion, soy bean meal, is not used merely as a filler but is actually a part of the plastic itself.

More than one million gallons of soy bean oil were used last year in enamel for Ford cars. Another 540,000 gallons were made into glycerin and used in shock-absorbers for the same cars. The oil is used, too, in the foundry as a core sand dry bond—at the rate of some 200,000 gallons a year. To supply this demand, the soy beans from more than 64,000 acres were required in addition to those raised on the 12,000 acre experimental farm.

"The production of molded plastics from this meal," says Mr. McCarroll, "is based on the ability of proteins to react with formaldehyde to produce a thermo-

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plastic resin. When great resistance to moisture or high dielectric strength is desired, resins are produced by the simultaneous condensation of the proteins and phenol or urea with formaldehyde in the presence of the cellulose and carbohydrates. These molded products show strength, moisture resistance and dielectric properties comparable to those in products employing the usual phenol formaldehyde resins. The same may be said regarding their forming and machining.

"To illustrate just what this soy bean plastic means

E section of the Ford molding division showing the first five presses and drills now in production on soy bean garnish trim. Note the waste cans at each press and the floor which is remarkably clean

to the farmer, let us suppose that just one additional part on each Ford car should employ this molding compound: Take for example a window reveal or trim strip; 144,000 bushels of beans per year, or the product of 7,200 acres, would be required. And this is but a single part, on one car, in the industry.

"We do not lay claim to any unusual invention in the use of soy bean plastics, but believe much practical progress has been made, and that by combined efforts under such a plan as Mr. Ford has outlined much may be gained to the benefit of industry and agriculture.

Soy beans are by no means the extent to which the Ford Motor Co. intends to promote this union of agriculture and industry. Nor are they satisfied that plastics—soy bean or otherwise—have progressed to anywhere near their ultimate goal in perfection and application. The tremendous production requirements of the company demand not only new types of plastic materials, but new methods of handling and

molding them. More flexible materials at lower costs is the ultimate goal and Ford engineers are well on their way toward meeting these demands. Progress in the experiments in recent months has included the production of usable benzyl cellulose which may be made from cotton, wood, plant stalks, or even the stalks of weeds. This product is capable of extrusion and with the completion of a special press now under construction it is predicted that extremely rapid and automatic production will result. It is from this new compound probably, rather than from soy bean plastics, that the garnish trim for all closed models and possibly instrument panels will be made when full production is finally reached.

Cellulose from yearly crops rather than from timber that requires years to replace is the aim of their present research, and experimental moldings indicate that this search is nearing its end.

Plastics in hospitals

(*Continued from page 35*) plastics are used extensively as covering for table tops, in particular as coverings for either the curved or flat styles of the Bucky Diaphragm used in radiographing. Since X-rays will pass easily through plastics, the use of these materials has opened the way for equipment more comfortable for the patient and at the same time has provided new conveniences and facilities for the physician.

Overlooking Manhattan's East River is a breathtaking, beautiful gray brick structure which houses New York Hospital and Cornell Medical Center—a perfect example of the science of modern hospitalization and the art of modern construction. Here is the brilliant essence of modern architecture—the adaptation of form to use; the eloquent answer to the needs of medical research in its bitter struggle for man against death. Sixteen solaria, an integral part of the building's exterior design, are so located in the central section that convalescents are able to reach them without too long a journey from any part of the hospital. In the decoration and furnishing of these sun rooms, there is the same absence of over-embellishment, the same economy of detail which makes the hospital so beautiful. And here, as one might expect, plastics are a part of the planned simplicity. Low reed tables and stools with gleaming laminated plastic tops in dark green and gold, highlight the deep warm yellow upholstering on the reed chairs. Sunlight from the sweep of windows is centered here; and even on dark winter days the room's purpose is fulfilled in its own color. In the more expensive private rooms, plastics are in evidence in inlaid tops and molded drawer pulls of bedside tables. Throughout the hospital, all overbed tables have three-sectional laminated tops, inlaid in metal frames, the center section of which may be raised to support books, papers or writing materials. In the extensive X-ray equipment for radiographic and therapeutic purposes, plastics are again important. In X-ray therapy the cylindrical parts of the treatment cones, which control direction of the rays, are of black molded plastic. For the radiographic tables, one of the new types uses black phenolic covering for its table top, Bucky Diaphragm back rest and cystoscopic seat. In addition, sheathes on urological

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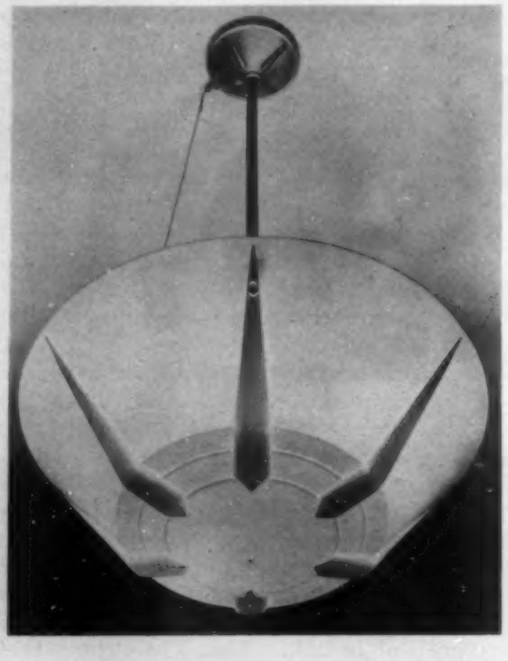
equipment are of sanitary molded plastic materials.

Although the Presbyterian Hospital in New York City has been in operation for many years, it is as advanced in equipment as many of the new hospitals. Here, molded plastic serving trays, as well as small hypodermic and medicine trays, have been used for several years. All overbed and bedside tables have tops of laminated plastics. The reason: more than any other material, plastics may be cleansed quickly and easily of stains caused by ink, medicine, and acid, and are unaffected by them.

H. E. Bishop, Superintendent of the Robert Packer Hospital, Sayre, Pennsylvania, believes that one of the largest recent uses of plastic material in hospitals has been for trays for food service and other purposes (such as the hypodermic trays and the trays used under water carafes). According to Mr. Bishop, the Robert Packer uses molded plastic squares under the push buttons at elevator control stations and similar places to protect the wall and "have found its use for this purpose very desirable." Elsewhere in the Robert Packer it is used for table tops; as fan blades in the electric fans—since the composition blades are much less dangerous than those of metal; as bottle caps on prescription bottles; and exclusively as ashtrays. "Many other uses," said Mr. Bishop, "are being developed and I have no doubt that we will soon be using it a great deal more than we are at present."



This Wakefield "Commodore" lighting unit, with its 19-inch reflector of molded urea fills the most stringent hospital lighting requirements

Queens General Hospital in New York City, opened last November, is one of the country's leading tax-supported institutions. This light-red brick building, with its accompanying nurses' quarters, is warmly simple in design—nine stories, rectangular, narrow in width.

so that the wards on each floor have light from windows on both sides, sunlight all day long and a view of open suburbs for miles. As in other hospitals, the number of uses for plastics precludes detailed listing, but especially important is the usage in the X-ray divisions. All radiographic X-ray tables are equipped with laminated plastic tops. The deep X-ray therapy equipment—used especially for the treatment of cancer—has a tube stand fitted with molded plastic "wings" which act as protection for the expensive glass tubing. In the dental clinic, black plastic tops form a smart contrast to immaculate white cabinets. In the eye clinic, plastics are again evident in the opthalmascope casings, similar to those used on much of the cystoscopic equipment. In the surgical division, electric cauteries are equipped with molded plastic handles because of their lightness and insulative qualities. And because they assure a good grip even when wet.

Typical room in Mt. Sinai Hospital showing one of the most frequent and important uses of plastics in hospitals. The bedside and overbed table tops are of laminated phenolic. The latter top is in three sections, the center of which may be raised to support books or papers

Only recently an all-plastic housing for the Comprex-Cautery's electrical apparatus has been developed. Molded of white urea into a shape similar to a small radio cabinet, the instrument can take its place proudly amidst the most advanced surgical equipment. Other varied uses are: acid proof tile floors in all laboratories; thermostats, liberally scattered throughout the hospital and nurses' home, have bases of molded plastic; laminated plastic table tops in the hospital's two cafeterias.

New York City's Department of Hospitals' impressive list of projects—in addition to Queens General Hospital—is due to be completed some time this year; the new women's pavilion and nurses' home at Harlem Hospital; additional wards at Lincoln Hospital; a new isolation pavilion and nurses' home at Kingston Avenue Hospital; new nurses' home at Metropolitan and Greenpoint Hospitals. And for 1937, the Department of Hospitals also has extensive plans for a much needed chronic disease hospital; a tuberculosis

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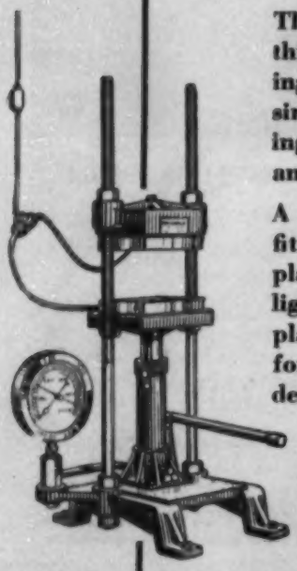

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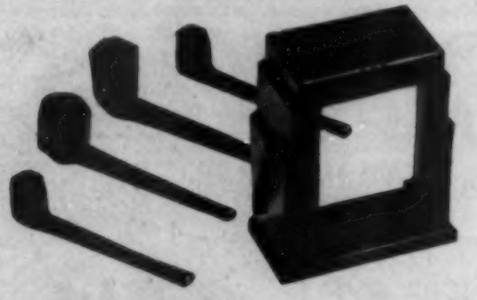

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unit for Bellevue; a children's building for City Hospital; nurses' home and staff house for Kings County Hospital; an additional wing and children's building for Sea View Hospital. Although figures on such projects outside New York City are unavailable at this time, it is understood that they will be of similar nature and extensiveness. In all such projects, it is certain that plastics will duplicate their already significant uses, and it will be interesting to see what newer developments this swiftly growing industry will be able to offer to hospitalization.

The question of sanitation comes up again and again when hospital superintendents and purchasing agents discuss their equipment needs. In sterilizing a portable object (dishes, trays, cutlery, etc.) for hospital use, it is not enough to wash it off with soap and water, nor even to plunge it into ordinary hot water in which the hands may be placed. Sterilization to hospitals means subjecting an object to water which is, or is very nearly, steam. More than that, such portable equipment has to be handled many times a day with speed and economy of motion. Only materials which are able to stand up under such treatment can be considered. Plastics have not always had the ability to perform under these conditions, but now many of them can. If ten years ago, a hospital purchasing agent was persuaded to buy a thousand trays of a new material, only to find their buckling, warping and chipping a constant annoyance, he is not likely to be friendly to anything which goes by that material's name. Some of the early plastic trays had that fate. Consequently, it is of prime importance that these people should know of the remarkable advancement plastics have made, that through stringent durability tests, materials have been developed—and successfully used—which will stand up under the worst sort of wear. It is not right that the excellent products now on the market, should suffer from the sins of their predecessors.

Also, it is surprising to find how scanty the average hospital purchasing agent's knowledge of plastic materials is. In all justice, it is a deficiency which can in no way be laid at his door. Even though he uses the materials widely, it is likely that, if he has thought of giving them a name at all he has called them Bakelite or Celluloid—no matter what material they were. There are, of course, instances where he has been informed, but they are rare. And an example of just how little practical information about plastics is offered to this market will make the situation clear. In one hospital this reporter was fortunate enough to encounter a salesman for some extremely expensive and modern equipment. And although laminated plastics were of prime importance to its construction and played a large part in that equipment's usefulness, the salesman was at a loss to name or to explain the material, other than to say vaguely that it was "some sort of composition."

Plastic materials have a vast opportunity to serve this several hundred million dollar industry of hospitalization through multiplicity of use, economy, durability, color and the inherent quality of lightness. Just how much of this market plastics will achieve depends largely upon the molders, laminators and manufacturers of these materials.

Down in Tennessee

(*Continued from page 29*)

Among them, acetate yarn has found a tremendous market but we will mention it briefly. Experimental work began in 1928 but it was not until autumn of 1931 that a semi-plant scale of operation had worked out satisfactorily, a yarn plant built, and commercial scale production had begun. Four years later, the capacity of the mill is six times that of the original unit.

This telephone of acetate may be made in any color required by decorators to perfect their plans

It was not until 1933 that Tennessee Eastman decided to enter the plastics field with an acetate molding composition called Tenite, although for several years its possibilities had been under investigation. Supplied in granular form, or in blanks cut to required sizes and exact volumes, Tenite changes physical form under the heat and exposure of molding. It is available to molders in all colors and shades, transparent, translucent, or opaque. It is strong and resilient and can be machined without chipping. It can be used for thin-walled sections where other than acetate types of molding material would be too brittle. It is resilient enough after molding, as a knob for instance, to sustain the driving-in of an inserted shaft with a rachet tooth to hold the knob on the shaft and is largely used for such applications.

A special grade of acetate is supplied in large quantities to a manufacturer of sheet plastics, who in turn supplies these sheets to glass manufacturers to put between two sheets of polished glass in the manufacture of safety glass for automobile windshields and other installations where protection from shatterable glass is desirable.

A number of writers have recently pointed out in these columns that plastics of practically all types are rapidly gaining acceptance among manufacturers of automobiles. This repetition is in no sense an editorial oversight. It is intended, rather, to impress those manufacturers, who may be too closely tied to traditional materials, that there are advantages of manufacture as well as advantages of merchandising in the structural and decorative uses of these new materials.

Strength, color and lustrous permanent surface constitute the three primary qualities which occasion the use of acetate molding composition in decorative and mechanical automotive applications. It is used for window regulator handles, dash control, glove compart-

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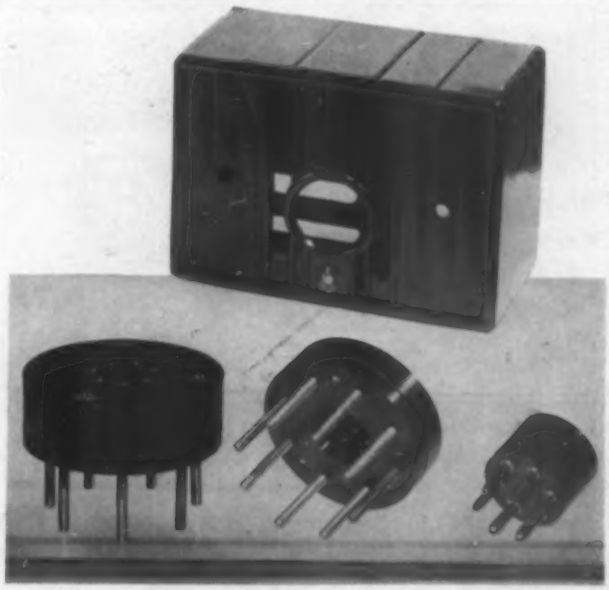

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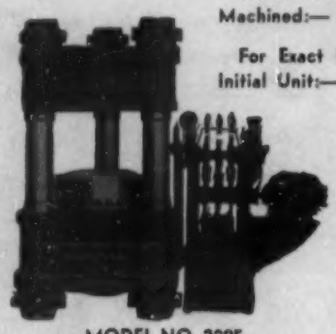

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ment and gear shift knobs, horn buttons, retainer rings, lock bushings and steering wheels. Twenty-six 1936 automobile models carry Tenite appointments. In addition to these, accessory items such as radios, heaters, lighters, and ash trays, carry fittings to match the cars in which they are installed.

Advantages of an acetate composition can be divided into those factors which appeal to the purchasers of motor cars, and those which appeal to the manufacturers, molders, interior hardware suppliers, body builders and motor car companies. Acetate is the only type of molding composition which offers mixed striated color effects resembling precious stones or mixtures of colors merely attractive in their beautiful contrasting hues, not necessarily resembling any natural material. Rather brilliant mixed colors have been found beautiful and suited to small interior automotive appointments, while such larger items as steering wheels and the accompanying horn buttons and retainer rings are usually more advantageously made in subdued shades to harmonize with the upholstery and interior trim.

The possibility of securing an acetate molding composition in transparent colors has created some unique effects. One well-known motor car company has molded transparent discs which on the underside have depressed letters which are filled in with suitable lacquer. These discs are mounted on the end of the dash control and a metal edge spun over them to hold them in place. Thus, the letters show through the transparent acetate plastic and yet at the same time the surface of these pieces is entirely smooth, giving

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no opportunity for the letters—which are ordinarily depressed into the surface—to pick up dirt and dust. Such letters give a much more finished appearance than symbols molded directly into the surface, as of course is necessary in the case of other than transparent material. The metal beading can be spun over the acetate discs without any risk of breaking the material due to its tough and resilient nature.

With other molding compositions, it is essential to mold a metal insert in the piece for mounting, either on window regulator handles or the shank for dash control knobs. With an acetate composition, the molded part is so tough that it is possible to drive the molded piece, containing an appropriate hole, over the shank. A shank, knurled at the end or provided with small ratchet teeth, so holds the molded piece in place that there is no risk of its becoming loose in use.

Molded pieces having different cross sections have a tendency, when molded of some plastics, to check on account of the difficulty of being "cured" to a point suited to both a thin and a thick section. The texture of an acetate molding is uniform throughout the piece.

Another advantage which has universal appeal among automobile drivers is that acetate moldings grow more lustrous through use and never become dull. Steering wheels and smaller controls constantly handled maintain a brilliant surface. Such wheels and controls not only look clean, but there is a total absence of any exudation or surface smudge which occurs where hard rubber is used without resinous or acetate protection. A molded steering wheel of acetate can be handled with white gloves with the definite knowledge that there is nothing in the material which can come off to soil them.

In addition to these qualities which appeal so much to the purchasers of motor cars, it is now possible through injection molding of acetate materials, a method which is akin to die casting of metal, to cover metal inserts. Thus can window regulator handles and remote control interior door handles be given, by this method, all the desirable qualities which are now inherent in an acetate knob and escutcheon going on the same handle.

Although large automobile companies maintain exceedingly active research programs, and their major developments are carefully worked out and tested well in advance of their introduction, there are frequently last minute changes in such style items as upholstery and trim which demand quick final changes in appointments which harmonize with them. It is in this type of emergency that Tenite proves its worth. It can be made up in its final form in the course of a few hours, and it is quite customary at the Tennessee Eastman plant to make partial shipment the same day telegraphic orders are received before noon. Of course, where special shades have to be originally matched, it takes a little longer than it does to make shipment of standard shades.

The centralized location of the Tennessee Eastman plant, its vast knowledge of materials gained through research in the highly technical field of photography, and its tremendous production facilities with economies of operation place it boldly in the foreground of dependable sources of acetate plastics for many years to come.

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